METAL INDUSTRY

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BRASS FOUNDER and FINISHER

ELECTRO-PLATERS REVIEW

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ELECTRO-PLATERS REVIEW

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Proposed Cost Accounting and Estimating System for Non-Ferrous Foundries

The Cost Committee of the Code Authority has Formulated the Following "Proposed Cost Accounting and Estimating System" Which Has Been Reviewed by the Code Authority and is Herewith Submitted to the Various Divisions for Consideration

THE Codes of Fair Competition for Miscellaneous Non-Ferrous Sand Castings and Steel and Rolling Mill Castings contain the following provision Section 3, Paragraph (1):

> "To make any sale or contract of a sale for any castings below seller's cost as determined by a system of cost accounting which conforms to the principles of and is at least as detailed and complete as a uniform and standard method of cost accounting to be formulated and adopted by this Division and approved by the Administrator."

The purpose of the following cost system is to provide a satisfactory system for those wishing to install a system or to change over their present system and at the same time provide a standard system for estimating purposes and a standard system to be used in checking up claimed violations of the Code. It is understood that the minima under this system will not recover full actual costs until such time as volume of business returns to normal and unless the cost of doing business (Item I) is included in costs.

The system provided for herein is recommended for the smaller foundries and the means for more detailing of it for larger foundries is indicated throughout.

Average departmental costs for each plant over a period of the preceding six months or one year, as developed by this system either in its simplest form or more detailed shall be used by each plant for estimating costs in order that quotations shall not be below costs. In case any plant fails to, does not desire to or cannot establish these average departmental costs for his own plant, then he shall be governed by the average departmental costs so established in from three to five plants in his district doing a similar class of work. The number of plants, the selection of the plants and the determination of the averages to be under the Executive Committee of the nearest Local Chapter. All findings to be subject to the approval of the Code Authority.

Whenever a material change occurs in wage rates, material or supply prices or overhead expenses new averages of departmental costs should be figured and from then on these new departmental costs used in estimating. All labor shall be estimated on the basis of paying wage rates at least equal to the average wage rates being paid in the territory for the class of work performed.

Where some of the departments shown are not operated in the plant in question they, of course, need not be incorporated in the figures.

I. Cost of Doing Business (Profit and Loss)

The following are considered as profit and loss items and are not figured as a part of costs but come out of apparent profits before any real profit is realized on business done:

11. Interest on investment.
12. Interest on debt.
13. Dividends on stock or bonds.
14. Research and development expense.
15. Bad accounts.
16. Declines in market value of inventory.
17. Special sales or advertising campaigns.

II. Fixed Overhead

Amount of fixed overhead to be distributed and absorbed is based upon relation of total business to the normal amount of business.

21. Rent.
22. Building maintenance and watchman.
23. All taxes except income taxes and sales taxes.
24. Fire insurance and all other insurance (except workman's compensation, group life and health, unemployment insurance).
25. Depreciation of buildings.

The basis for depreciation shall be original cost including freight and installation, except that in the case of plant and equipment acquired at an abnormal price the basis shall be the fair replacement value of such assets.

Brick concrete or steel frame	min. 2%
Masonry with frame interior	" 3%
Frame	" 4%
Corrugated Iron	" 5%

26. Depreciation of equipment.—Same basis as for buildings but at average flat rate of not less than 10%.
27. Administration and office expense, directors fees, dues, subscriptions, legal expense, auditing expense, etc.
28. Sales expense, commissions, advertising.

The least portion of fixed overhead which must be absorbed is that percentage of the total fixed overhead that the current volume of business in pounds of good castings produced during the preceding three calendar months bears to the "normal" volume of business in pounds for the particular plant. The "normal" volume of business in pounds for any plant is considered as 60 percent of that plant's best six consecutive months production since January 1, 1924 (ten years). If, however, added capacity has been made by such plant since the period of the best six consecutive months production after January 1, 1924, then the "normal" volume of production shall be increased by the ratio of increase in plant facilities. Such ratio of increase shall be determined by the percentage of increase in plant investment. Likewise if any facilities in use during the period of the best six consecutive months after January 1, 1924, have been sold or otherwise disposed of then the "normal"* volume of production shall be decreased by the ratio of decrease in plant investment.

Having determined the percentage as above then that percentage of fixed overhead must be absorbed in the various departments.

Items 21 to 25 above are preferably distributed to departments on basis of floor space in each department, item 26 on basis of value of equipment installed and items 27 to 29 on basis of total payroll dollars or total labor man hours in each department. If individual distribution is not desired in any plant it is permissible to distribute the total "fixed overhead," (total of items 21 to 29 inclusive adjusted for current volume of business) to the departments on basis of total payroll dollars or total labor man hours in each department.

III. Operating Overhead

The entire operating overhead must be distributed to and absorbed in the various departments.

31. General plant labor.
32. Plant supervision and plant office help.
33. Fuel and power, supplies and tools in boiler and engine room.
34. General supplies.
35. Workmen's compensation insurance.
36. Loss on product scrapped, including returns from customers. (Not less than 5%).
37. Laboratory.

The total operating overhead is distributed on the basis of total payroll dollars or total labor man hours in each department.

IV. Metal

Metal cost equals initial metal cost per pound plus metal expense per pound times weight of casting plus percent of shrinkage.

41. Raw metals, purchased scrap, and alloys including freight and cartage. All at current market price for grade of metal used.
42. Metal expense.
Unloading, sorting and storing labor. Sampling inspection and analysis expenses on incoming metals.
Total metal expense 42 for a period of one year divided by pounds of metal gives average metal expenses per pound.
43. Shrinkage (based on type of metal used, etc., not less than 5% of metal value 41).

V. Melting

Melting cost per pound of metal equals total of 51 plus 52 divided by pounds of metal used under IV.

51. All labor in the melting department.
Handling metals and scrap, making up charges, melting, repairing furnaces, metallurgists and chemists time spent on metals.
52. Burden.—All other items chargeable to the melting department.
    (a) Melting fuel including freight and cartage and including power for electric melting.
    (b) Supplies such as fluxes, crucibles, fire bricks, fire clay, and tools such as crucible tongs, shanks, shovels scoops, etc.
    (c) Costs of analyses and tests made on metals.
    (d) Share of operating overhead. (based on labor hours or payroll dollars).
    (e) Share of fixed overhead. (based on labor hours or payroll dollars).

VI. Molding

Molding cost equals direct labor plus burden plus direct materials.

61. Direct labor such as molders, apprentices, molders helpers, and any other labor which can be directly charged to individual jobs such as skin drying, finishing, core setting, etc.
62. Burden.—All other items except direct materials chargeable to Molding Department. Burden shall be proportioned against each job on basis of either total direct molding labor cost in dollars or direct molding labor total in man hours.

* See chart on page 301.

(a) All labor not directly chargeable to individual jobs such as—preparing molding sand, mixing facing; transporting sand, castings, patterns, flasks, boards, supplies, etc.; repairing equipment in the department; foremen and clerks, repairing patterns not chargeable to customer.

(b) Supplies and Tools such as molding sand, including freight and cartage, facings sea coal, parting, plumbago, shovels, riddles, brushes, reamers, clamps, gaggers, chaplets, nails, air hose and fittings, etc. Pattern and flask repair parts and repair parts for equipment.

(c) Fuel and power.

(d) Share of operating overhead. (based on direct labor (61) plus indirect labor (62a) either man hours or payroll dollars).

(e) Share of fixed overhead. (based on direct labor (61) plus indirect labor 62 (a) either man hours or payroll dollars).

63. Direct materials chargeable to individual jobs such as special flasks, match plates, etc.

VII. Core Making

Cost of cores equals direct labor plus burden plus direct materials.

71. Direct labor such as coremakers, apprentices, coremakers helpers, and any other labor which can be directly charged to indvidual jobs such as venting, blacking, pasting, assembling, filing, rubbing, coating, gauging, etc.

72. Burden.—All other items except direct materials chargeable to the Coremaking Department. Burden shall be apportioned against each job on basis of either total direct core labor in dollars or direct core labor in man hours.

(a) All labor not directly chargeable to individual jobs such as preparing core sand, mixing, tending core ovens, transporting core sand, core boxes, repairing core boxes not chargeable to customer, repairing equipment, foremen and clerks.

(b) Supplies and tools such as core sand including freight and cartage, binders, core compounds, core oil, shovels, riddles, brushes, rammers, core plates, core wire, core rods, nails, core wax, etc., core box repair parts and repair parts for equipment.

(c) Fuel and power.

(d) Share of operating overhead. (based on direct labor 71 plus indirect labor 72 (a) either man hours or payroll dollars).

(e) Share of fixed overhead. (based on direct labor 71 plus indirect labor 72 (a) either man hours or payroll dollars).

73. Direct materials chargeable to individual jobs such as special core rods, boxes, driers, etc.

VIII. Cleaning, Trimming, Rough Grinding and Sand Blasting Department

Cost per job in this department equals direct labor plus burden plus direct materials.

81. Direct labor which can be directly charged to individual jobs such as for cutting off gates and risers, tumbling, sand blasting, pickling, removing cores, grinding, filing.

82. Burden.—All other items except direct materials chargeable to this department. Burden shall be apportioned against each job on basis of either total direct labor cost in dollars or direct labor total man hours.

(a) All labor not directly chargeable to individual jobs such as those indicated under direct labor and repairing equipment, clean up labor, foremen and clerks, transportation of castings and scrap.

(b) Supplies and tools such as sand blast sand, steel shot, grinding wheels, band saws, hack saws, files, pickling acids, equipment repair parts, etc.

(c) Fuel and power.

(d) Share of operating overhead. (based on direct labor 81 plus indirect labor 82(a) either man hours or payroll dollars).

(e) Share of fixed overhead. (based on direct labor 81 plus indirect labor 82(a) either man hours or payroll dollars).

83. Direct materials chargeable to individual jobs such as special cutters, band saws, tools, wire brushes, cut off wheels, trimming dies, etc.

IX. Machining, Polishing and Finishing Department

Cost per job in this department equals direct labor plus burden plus direct materials.

91. Direct labor which can be directly charged to individual jobs such as drilling, tapping, turning, boring, grinding, polishing, buffing, pickling, electro cleaning, plating, coloring, etc.

92. Burden.—All other items except direct materials chargeable to this department. Burden shall be proportioned against each job on basis of either direct labor cost in dollars or direct labor total in man hours.

(a) All labor not directly chargeable to individual jobs such as those indicated under direct labor and also repairing equipment, clean up labor,

transportation of castings, foremen, clerks, etc.

(b) Supplies and tools such as tool bits, drills, taps, reamers, polishing grit, wheels, and compounds, cleaning compounds, acids, plating supplies and anodes, hangers and supports, equipment repair parts, etc., not chargeable to individual jobs.

(c) Fuel and power.

(d) Share of operating overhead. (based on direct labor 91 plus indirect labor 92(a) either man hours or payroll dollars).

(e) Share of fixed overhead. (based on direct labor 91 plus indirect labor 92(a) either man hours or payroll dollars).

93. Direct materials chargeable to individual jobs such as special cutters, tools, dies, grinding and polishing wheels, plating racks, lacquers, paints.

X. Inspection, Packing and Shipping Department

Cost per job in this department equals direct labor plus burden plus direct materials.

101. Direct labor which can be directly charged to individual jobs such as gauging, pressure testing, wrapping separately, making special cases, etc.

102. Burden.—All other items, except direct materials chargeable to this department. Burden shall be proportioned to each job on basis of either total direct labor in dollars or direct labor total man hours.

(a) All labor not directly chargeable to individual jobs such as those indicated under direct labor and also repairing equipment, clean up labor, transportation of castings, marking and billing, foremen, clerks, truck drivers.

(b) Supplies and tools such as bags, boxes, crates, cartons, paper, etc., not chargeable to individual jobs.

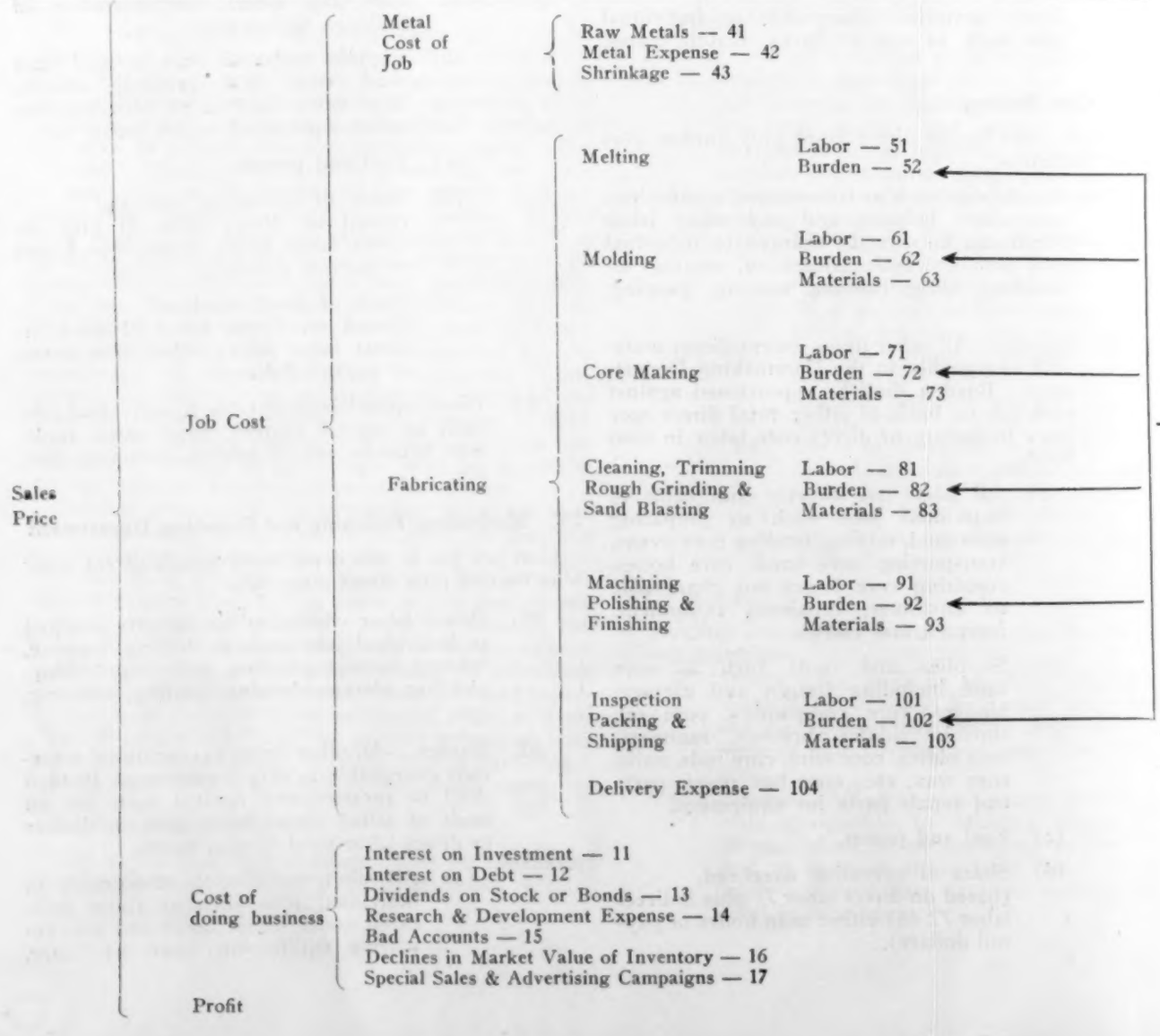
(c) Fuel and power.

(d) Share of operating overhead. (based on direct labor 101 plus indirect labor 102(a) either man hours or payroll dollars).

(e) Share of fixed overhead. (based on direct labor 101 plus indirect labor 102(a) either man hours or payroll dollars).

103. Direct materials chargeable to individual jobs such as special gauges, testing devices, boxes, cartons, crates, containers, etc.

104. Delivery expense.



Storing and Handling Sheet Brass and Nickel

Landers, Frary and Clark, of New Britain, Conn. use large quantities of brass, nickel and other sheets, usually in long and narrow sizes. The safe and efficient storage of these sheets has been developed in an interesting manner which has given very satisfactory results.

The layout of the storage space is shown in the diagram. It will be seen that there are three parallel rows of racks on which the sheets are laid. Between these are tracks on which a four-post electrically operated stacker travels. The two lines of tracks switch together at one end so that the one stacker may serve for either line.

Near the center of the lines of racks there is an open space where the stacker may be stopped for loading or unloading.

The procedure is very simple. One load consisting of many sheets is usually handled to prevent damage, either in storing or in taking out for manufacture. Very little manual handling is required, which results in a great deal of saving from damage to the sheets, and also reduces hazards to employees. When a load has been taken down from its rack and delivered to the open space between the stock lines it is taken away with a jack lift truck.

—F. A. Westbrook.

Four-Post Electrically Operated Stacker

Normalized
Page 298

FIXED OVERHEAD

Rent — 21
Building Maintenance & Watchmen—22
All Taxes Except income & sales Tax — 23
Fire Insurance, and all other insurance (except workman's compensation, group life and health, unemployment insurance) — 24
Depreciation of Buildings — 25
Depreciation of Equipment — 26
Administration & Office Expense, directors fees, dues, subscriptions, legal expense, auditing expense, etc. — 27
Sales expense, commissions, advertising — 28

OPERATING OVERHEAD

General plant labor — 31
Plant supervision and plant office help —32
Fuel & power, supplies & tools in boiler & engine room — 33
General supplies — 34
Workman's compensation insurance — 35
Loss on product scrapped, including returns from customers — 36
Laboratory — 37

This article will be continued in an early issue.—Ed.

The Effect of Some Mill Variables on the Gauge of Sheet Brass

C. K. SKINNER

General Electric Company, Bridgeport, Conn.

In General the Variables Encountered in Mill Practice Which Greatly Influenced the Gauge of the Sheet Metal Were: 1. The Roller's Ability; 2. The Heat of the Rolls; 3. The Width of the Metal; 4. The Reduction Per Pass; 5. The Temper of the Metal. Those Which Had Little Bearing Were: 1. The Speed of Rolling (Within Stated Range); 2. Variations in Cast or Overhauled Bar; 3. Oxidation from Anneal. Part 2*

Procedure and Results

The effect of the various items mentioned above on the gauge of sheet is given herewith as a point procedure in the order given.

I. **The effect of gauge variation in cast bars and that made by the overhauling machine.**

During preliminary gauging work, it was thought that the end to end variation was a function of the end to end variation in the casting. At this stage the old rollers' theory that "The last end through the rolls was always lighter than the stuck end" had been disproved by many tests. It could not be readily told which end would come out heavy or light. Several lots of castings were gauged and found to be consistently heavier on the butts. It was then concluded that this heaviness persisted in all the rollings unchanged, and, according to the reversals in the process, made the heavy end sometimes the stuck and sometimes the last.

To check this theory a batch of bars was carefully gauged from the casting down to .020" through the regular processing. The average percent end to end variation in the castings amounted to 3%. After overhauling and running to .175" the variation was nil. Another more complete run was made on 25 bars of 6½" high brass. The gate ends of these were stuck most of the way down. (Gate ends are not usually stuck on the breakdown because of their cracking tendency due to hardening at the cutting off operation).

The graphical results of this test are shown on

* Part 1 was published in our August issue.—Ed.

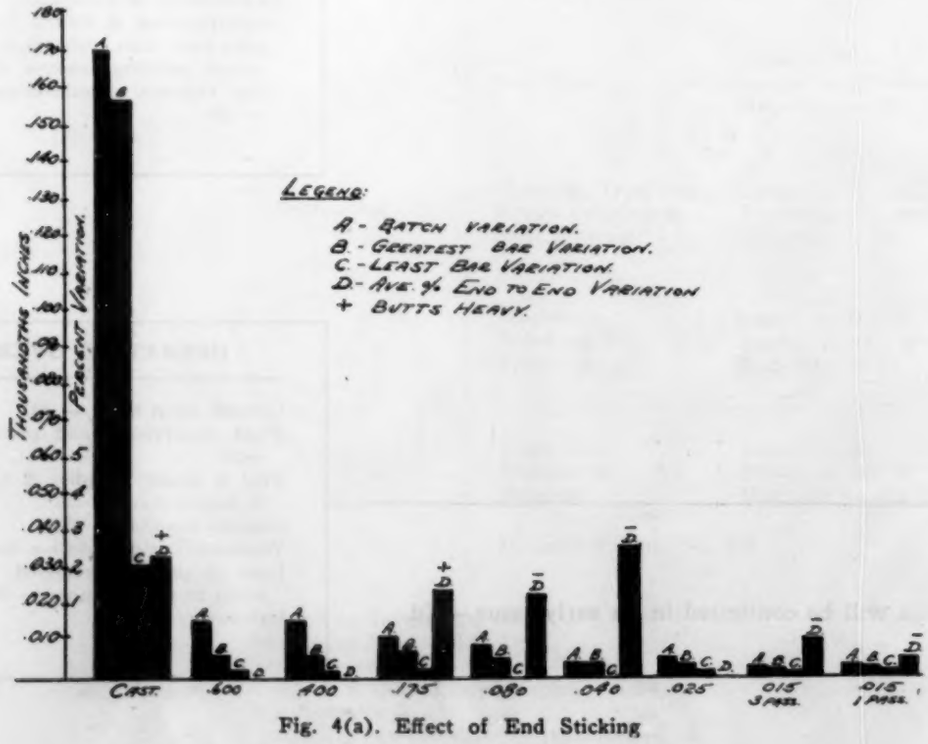


Fig. 4(a). Effect of End Sticking

Fig 4(a). The great variations in the castings were diminished in one rolling to 0.600". The 2% end to end variation disappeared. The next operation introduced no new differences. The rolling to 0.175" brought back a 1.3% end to end variation, the butts heavy; and so on down to 0.015" with interesting shifts.

The same procedure was tried and found to hold true with lots that had acquired variations in the overhauling machine due to poor cutting conditions. An example of poor cutting is shown on Fig. 5, where more was taken from one side of the bar than the other. The butt end persists in its heaviness after the cutting. Processing to .125" showed that these variations were quickly ironed out or new ones due to other conditions crept in.

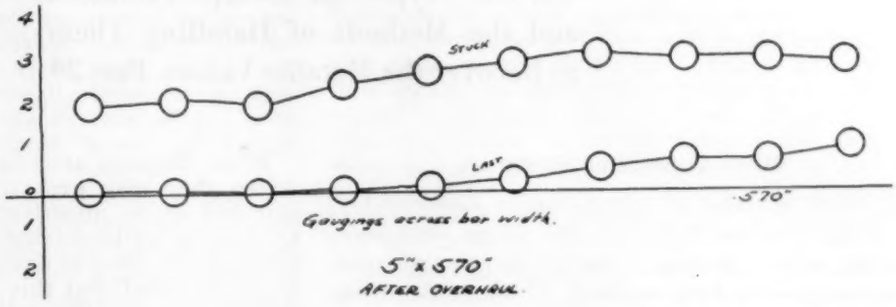


Fig. 5. Percent Variation From Nominal Gauge

Hence—

Point 1. Variations such as usually occur in cast bars or in poor overhauling have no material effect on the finish gauge of sheet brass.

II. The effect of oxidation from anneal to anneal.

It was thought that, in the case of soft brass, a highly oxidizing anneal would in some measure change the gauge of the piece. Several commercial batches were gauged before and after ordinary anneals and no difference in gauge noted. A more careful test was made on small pieces as follows: Pieces of high brass, low brass, and copper were wiped dry of oil and carefully gauged.

The pieces were then put into the furnace and oxidized as highly as possible. On withdrawal they were scaled and then pickled in 6% sulphuric acid solution, washed in cold water and dried out in sawdust.

They were then carefully gauged again and the difference found to be nil.

Hence—

Point 2. Oxidation to the extent in mill practice has no effect on the gauge of sheet brass.

III. The effect of differences in temper of bars.

It has long been said in rolling mills that bars coming out of the furnace not fully annealed are hard to roll. Hence for the same width and reduction soft bars would come from the rolls thinner than hard bars on the same set, because the soft bars would exert less resisting pressure to the rolls and cause less deflection.

A great difference in degree of softness was first considered. A bar was annealed to net a grain size of .038 mm; Rockwell, 69.0 at .0235". An identical bar as to chemical composition and width and gauge was annealed so that it had a grain size of .120 mm.

Fig. 6 shows the results of this test; and it will be noted that soft bar rolled for the same set to a gauge averaging entirely below the nominal gauge, whereas the harder of the two yielded an average, except for the edges, entirely above the nominal gauge.

But the difference in temper so great as in the above do not exist in mill practice. Rarely do the grain sizes vary more than the limits of a standard anneal.

Another batch, this consisting of 25 bars, was gauged at ready and found to be of even gauge.

The bars were rolled to .015" and the detailed gaugings made. The spread of the grain size of these bars, .016 mm. from .037—.053 was not influential on the gauge. For bars finishing to gauge one pass the lightest and heaviest of the lot had grain sizes the same; as also did bars finishing to gauge in three passes. On the other hand, the widely variant grain

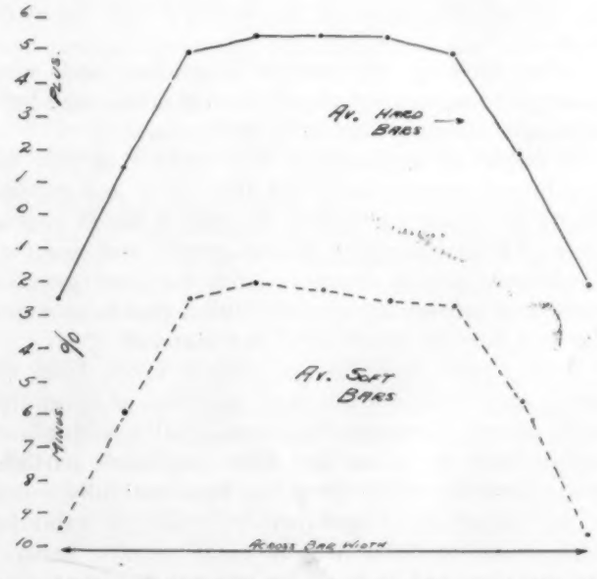


Fig. 6. Percent Variation From Nominal Gauge of Soft and Hard Bars.

size of the bars in the first part of the test, a spread of .082 mm. made for a difference of about 7% in gauge variation.

Point 3. Bars that vary in temper outside of the limits of one anneal cannot be accurately rolled in the same set, but that within the limits of an anneal the temper of the bars has no effect on their gauge.

This article will be continued in an early issue.—Ed.

Treating Waste From Silver Manufacture

By ERNEST H. SMITH

Metallurgist

Various Types of Scrap Produced and the Methods of Handling Them to Recover the Metallic Values. Part 2*

Silver Content of Sweep

The silver contents of sweep varies considerably, some being comparatively rich and others very poor, depending on the amount of preliminary examination and treatment they have received. Low grade sweep may contain as little as 15 to 20 ounces of silver per hundredweight, whilst average lots will contain from 50 to 100 ounces per hundredweight or even more in exceptional cases. The first stage in the treatment of sweep is to reduce the mass of rubbish to workable proportions, and this is effected by burning it to remove all paper, sawdust, and other combustible matter. This preliminary burning, which is known as dressing, is generally left to the refiners, but is sometimes carried out at the factory before the sweep is sold.

After burning the sweep is ground and sifted through a fine sieve of about 16 to 20 mesh, with holes about one-thirty-second of an inch square.

It might be supposed at first sight that this fine grinding is unnecessary, and that labor and expense might be saved by sifting through a much coarser sieve of from one-eighth to one-quarter inch aperture. Experience proves, however, that the finer grinding gives that uniformity in composition that is so essential to a correct valuation of the material.

With coarse material one sample taken from the sweep may contain a few large particles of silver that have passed through the sieve, whilst a duplicate sample may be quite free from any such particles even when the whole heap has been carefully mixed before sampling. Consequently, errors in valuation arise owing to differences in assay results, between the samples, and it must be remembered that comparatively small errors on an assay sample will represent considerable differences when calculated on a hundredweight of sweep. With finer grinding these stray particles of silver would be left on the sieve. To get reliable samples the material must be sufficiently fine and must be well mixed; in fact, it may be said that the secret of correct sampling and valuation is sufficiently fine grinding and thorough mixing.

When disputes arise in regard to the valuation of sweep they may generally be traced to insufficient grinding or to imperfect mixing. To prevent loss by dusting whilst mixing and handling it is the practice in some cases to damp the sweep just sufficiently to lay the dust, but this watering must, perforce, be strictly limited. The valuation of the heap, however, is based on the dry material. If the sweep has been dressed and mixed at the silver factory several refining firms may be invited to sample it and make an offer.

In this case the sweep is usually sampled by the refiners' representative by means of an iron borer, which resembles a large cheese borer, about 3 ft. long, and about 1 in. bore. The borer is dug into different parts of the heap and the cores thus obtained are well mixed together and then samples of from 1 to 2 pounds taken in duplicate. A third sample is also taken in many cases and reserved for reference in the case of dispute. When properly sampled the quotations tendered for the sweep are as a rule very close.

Smaller lots are frequently sampled by flattening the heap and digging out portions from different parts with a scoop and then thoroughly mixing the several portions together for the final sample. The refiners usually sample large lots sent to them by the old Cornish method of coning and quartering, these operations being repeated until the bulk has been reduced to a size suitable for taking the sample proper.

The particles of silver, usually termed "Metallics", left on the sieve after grinding and sifting the sweep, are weighed and then melted and cast into a bar which is assayed and the silver content allowed for in the valuation of the sweep heap from which it came originally.

The Treatment of Buffing Sand and Lime, etc.

The next materials to be considered under the head of solid waste are sand, lime, pumice and similar materials resulting from the buffing and finishing processes, and including also the residue from the pumicing and stoning sink.

Unlike sweep, these materials contain no visible particles of silver. The silver content may be fairly high, but it is in a very finely divided state forming a film or coating on the particles of the abrasive or polishing material. These waste materials contain a considerable amount of fluff and grease which make them clammy. It is therefore considered a good plan to have, inside the doorway of each buffing and finishing shop, a well cut in the floor into which an iron grating is fitted. The workman then scrapes his

* Part 1 was published in our August issue.

boots on this each time he goes out, and the scrapings of sand, etc., thus collected are added to the bulk for sale.

All waste from the buffing and finishing shops is invariably sold direct to the refiners, but if sampled on the seller's premises, the sample is usually taken with a tube as previously described for sweep. The silver content of these materials varies considerably and is dependent on the length of time they have been in use. When rich they will contain as much as 250 ounces of silver per hundredweight, whilst samples of average lots will give from 175 to 200 ounces per hundredweight.

The methods adopted by the smelters for extracting the silver from this class of waste vary somewhat according to the plant available, and also on the nature of other waste materials being dealt with, but as a general rule it eventually finds its way into the smelting furnace where the silver is alloyed with lead and subsequently separated by the cupellation process.

Other solid waste is the sawdust which is used for drying out after pickling and electroplating, and contains more or less silver solution derived from these operations. When no longer fit for use, sawdust is generally added to the sweep heap and is eventually burnt. From the plating shop we have also the copper suspension wires which become coated with silver.

This wire may be stripped in the plating shop and used again or sent to the refiners for treatment with other waste.

All old mops or buffs and other polishing appliances are also reserved and eventually sold to the smelters.

The wooden floor racks or duckboards provided in front of the plating vats, etc., after long use also contain some silver solutions derived from vat drippings, etc., and will pay for recovery. These are sold to the refiners and are subsequently burnt and the silver recovered.

Treatment of Liquid Waste

Stripping Solutions.—Turning now to liquid waste, produced chiefly in the plating shop, the first to be considered as being the richest in silver is the stripping or strip-solution used for removing the silver deposit from electroplated articles before re-plating.

These solutions consist of strong sulphuric acid to which a small quantity of nitric acid or preferably of potassium nitrate has been added. The silver is recovered by the addition of common salt or hydrochloric acid, and the chloride collected and washed. Before precipitating, the strongly acid stripping solution should be diluted by pouring it into about three or four times its volume of water, preferably hot, and not **vice versa.**

It may be mentioned here that when silver chloride is precipitated in a hot solution, and then well stirred, it coagulates and readily sinks to the bottom of the vat, whilst with a cold solution the precipitate is more finely divided and settles slowly even after vigorous stirring. The salt should be added in the form of a strong solution and not in lumps.

Experience soon indicates the correct amount of salt to be added but it is advisable again to test the clear solution after the silver chloride has settled. These precipitates are known in the trade generally as chlorides. Very frequently, however, as shown later, they consist of a mixture of finely precipitated silver and silver chloride as the result of a partial separation of the silver in solution by means of metallic copper or iron. An alternative method to that just described, and one that is frequently used, is to precipitate the silver as metal.

This method is based on the fact that owing to differences in the chemical properties of metals it is possible to deposit one metal upon another by simple immersion. Thus copper, iron, zinc, and aluminum are all capable of throwing silver out of solution when placed in the silver solution.

The finely crystalline precipitate of silver is, however, only loosely adherent so that it is readily washed off or sinks to the bottom of the vat. Both clean scrap copper and sheet iron are used for recovering the silver from stripping and similar solutions, the silver being deposited as a mud or sediment which is collected, washed, and dried and then sold to the refiners. Usually, clean copper sheets are hung in the solutions with occasional stirring over several days. Although copper is the more expensive metal to use it is preferable to iron for the reason that iron will also throw down any copper that may be present in the silver solution and thus give an impure silver-copper precipitate. The same remarks apply to the use of zinc, and to aluminum.

Another objection to iron is that its solution is readily oxidized on exposure to air, so that the surface of the liquid in the vat soon becomes covered with a reddish-brown film or deposit of rust, part of which settles and contaminates the silver precipitate. When iron is used clean sheet scrap is best but it should be free from any tinplate as the presence of tin in the precipitated silver is very objectionable. Galvanized iron scrap may be used as the coating of zinc is not detrimental.

It must also be noted that metallic lead will throw silver out of solution, and this accounts for the grey deposit found on lead lined tanks containing pickling acids, etc., and also for the fact that old lead linings when stripped from the vats after long use will yield a considerable amount of silver.

The deposit found on Monel metal, and other base metal baskets used for pickling small articles, also consists of silver thrown out of solution by the base metal.

Pickling Solutions.—The pickle or boil, consists of dilute sulphuric acid in which sterling silver is dipped after annealing to remove the oxidized surface. When silver alloyed with copper is annealed in an oxidizing atmosphere both metals are oxidized but the copper to a much greater extent than the silver. On immersing this annealed metal in hot dilute sulphuric acid the copper oxide is more readily attacked and passes into solution, but only a small quantity of the silver is dissolved. Consequently, pickling solutions do not, as a rule, contain much silver unless they have been in use for a long time. Some of this silver is deposited on the lead lining and metal basket as stated, or forms a deposit at the bottom of the tank.

The remainder is usually removed by adding a little common salt or hydrochloric acid, and allowing the silver chloride thus formed to settle before the acid liquor is drawn off and thrown away. The sediment, a mixture of metallic silver and silver chloride is then collected and sold to the refiners.

All rinsing waters and other liquids containing silver may be treated in the same way for the recovery of the relatively small amounts of silver they contain.

This article will be concluded in an early issue.—Ed.

The Rapid Determination of Nickel and Chlorides in Nickel Plating Solutions

By WALTER R. MEYER
Electro-Chemist, General Electric Company, Bridgeport Works

A Short Cyanide Titration Method for the Analyst Who Has Many Solutions To Check

METHODS for the determination of nickel and chlorides in nickel plating solutions have been published from time to time, which however, to the writer's knowledge, require four or more operations for completion. An analyst, who has many solutions to check, will find this short method will save many hours of labor.

The most commonly used volumetric method is based on that of T. Moore (Chemical News lxxii, 92) whose description of the method is as follows:—

"If to an ammoniacal solution of nickel containing AgI in suspension, (silver iodide being almost insoluble in weak ammonia) there is added potassium cyanide, the solution will remain turbid so long as all the nickel is not converted into the double cyanide of nickel and potassium, the slightest excess of cyanide being indicated by the clearing up of the liquid."

The reactions may be represented as follows:—

$NiSO_4 + 4\ KCN = K_2Ni\ (CN)_4 + K_2SO_4$

$AgNO_3 + KI = AgI + KNO_3\ (Ni = 4\ KCN)$

$AgI + 2\ KCN = KAg\ (CN)_2 + KI$

Manganese, copper, and cobalt, if present, render the method valueless and zinc and iron interfere but their effect may be averted by the use of sodium pyrophosphate. The novice and sometimes the experienced analyst may add too much ammonia before beginning the titration with cyanide and thus prevent the precipitation of silver iodide making the end-point impossible to read.

Although the ultimate chemistry of the methods published based on Moore's method may have been the same, the technique employed has varied considerably. The method published in the Platers Guidebook requires over six operations for completion with rather indefinite additions of tartaric acid, KI, and silver nitrate. Blum and Hogaboom in the second edition of "Principles of Electroplating and Electroforming" and Pan (Metal Cleaning and Finishing, Sept., 1931, page 732) use shortened methods but both make the error of not including enough silver nitrate in the cyanide solution to completely react with the KI added until over 45 cc. of the cyanide solution have been used in the titration. An error as great as one cc. may result depending upon the strength of the nickel solution titrated and the method of standardization.

Stratification of Solutions

Stratification occurs from anode solution and deposition of metal at the cathode during electrolysis. This was very clearly shown by W. M. Phillips at the 1934 annual convention of the Electroplaters Society by means of projecting an operating plating solution upon the screen. A dense layer of solution forms at the anode due to the dissolving of the anode. This layer, being heavier than the main solution sinks to the bottom of the plating tank. A layer lighter than the main solution forms at the cathode due to deposition of metal and this layer tends to gradually rise. The factors governing the rate of stratification will be the temperature of the solution, the amount of agitation, the anode efficiency and the cathode efficiency.

Sampling of the Solution—Standard Volume

When the sample is withdrawn from the plating solution, the sampling tube is lowered slowly through the solution until the bottom is reached. The finger is then placed over the open end of the tube and the tube is slowly withdrawn from the tank. The lower end of the sampling tube should be small enough so that no solution runs out of the tube on withdrawal. The smaller the opening, the more slowly must the tube be lowered into the solution. The sample should never be scooped off the surface of the solution. The number of samples taken will depend upon the size of the tank, but in every case, they should be evenly distributed along the tank.

Every tank should be marked for the standard level of the plating solution and the distance measured between this mark and the solution level at the time of sampling. The solution analysis may then be corrected to standard volume by the following relations:—

A = analysis corrected to standard volume.
S = analysis of solution as sampled.
D = standard depth of solution.
d = distance between solution level when sampled and standard level.

When level is below standard

$$A = \frac{S \times D - d}{D}$$

When level is above standard

$$A = \frac{S \times D + d}{D}$$

d and D are usually expressed in inches.

The conversion of the analyses to standard level is necessary before calculation can be made to adjust the solution to standard formula.

The errors involved in failing to note the solution level may be realized more fully by a consideration of a typical example. In a tank with a 30" depth, a drop of one inch of the solution level involves an error of over 3%, 2" over 6% and 3" an error of ten percent. This problem is too frequently neglected particularly in the cases of hot solutions where the rate of evaporation is rapid.

Size of Sample for Analysis

The sizes of samples for analysis recommended in the literature vary from 1 cc. to 25 cc. A study of the percentage errors involved will show that the sample used should contain at least 10 cc. If the 10 cc. sample requires more than 50 cc. of titrating solution, increase the strength of the titrating solution but do not use a smaller sample. Assuming that the sample can be measured accurately to one drop or .05 cc., the limit of accuracy for a 10 cc. sample is .5%, for a 5 cc. sample it is 1%, and for a 1 cc. sample the error is 5%. A study should be made of the accuracy limits of all the steps in an analytical procedure and the answer taken as accurately as the greatest error limit.

Rapid Determination of Nickel and Chloride

The following methods for determining nickel and chlorides in nickel plating solutions have proved, over three years use, to be rapid and accurate. They have been used for solutions ranging in pH from 4.8 to 6.4 and with metallic nickel contents up to 10 oz. per gallon. The nickel method submitted has been checked many times against the electrolytic and dimethyl glyoxime methods for determining nickel. The chloride determination is standard procedure with the indicator and water addition combined to insure a definite amount of indicator.

SOLUTIONS		REMARKS
A		
$NaCN$	60 grams	accurate to .5 g.
$AgNO_3$	3.40 "	accurate to .01 g.
Water to make 1 liter		
B		
KI	.40 grams	accurate to .01 gram
con. NH_4OH	35 cc.	accurate to .5 cc.
$Na_4P_2O_7.10H_2O$	50 grams	accurate to .5 g.
Water to make one liter		
C		
$Na_2CrO_4.10H_2O$	2 grams	accurate to .1 g.
Water to make one liter		
D		
$AgNO_3$	17.000 grams	should be weighed accurately to .005 g. as it is 1N silver nitrate solution.
Water to make one liter		

Notes:

1. Solution A may be standardized against a nickel solution that has been standardized electrolytically.

2. Solution A decomposes when exposed to air and should be kept in glass-stoppered, brown bottles.

3. In making solution B, dissolve the sodium pyrophosphate in hot water, cool and add the KI, NH_4OH, and then dilute to one liter.

4. Solution D is the only solution made up as an exact standard.

Standardization of Solution A

Weigh out .4 — .6 grams of pure nickel to the fourth decimal place and put into a 250 cc. Erlenmeyer flask. Add 5 cc. of con. nitric acid and heat to expel NO_2 fumes after the nickel has dissolved. Cool, and add 25 cc. of water and NH_4OH (1:1) dropwise to the appearance of incipient blue color. Add no excess. Add 50 cc. of solution B and titrate with solution A to disappearance of turbidity.

$$\text{Nickel Factor (NF)} = \frac{\text{wt. Ni} \times 13.4}{\text{cc. sol. A}}$$

Analysis

Metallic Nickel

Pipette exactly 10 cc. of the filtered plating solution into a 250 cc. flask and add 50 cc. of solution B. Titrate with solution A to disappearance of turbidity.

Chlorides

Pipette exactly 10 cc. of the filtered nickel solution into a 250 cc. flask. Add 50 cc. of solution C and titrate with solution D until a buff color appears.

Calculations

Oz./gal. Ni = cc. A x NF.

Oz./gal. $NiSO_4.7H_2O$ = cc. A x NF x 4.786 (when no $NiCl_2.6H_2O$ is present).

Oz./gal. $NiSO_4.7H_2O$ = cc. A x NF x 4.786 — (cc. D x .188). To be used when single nickel salts and nickel chloride are present.

Oz./gal. $NiCl_2.6H_2O$ = cc. D x .16 (when all chloride is nickel chloride).

Oz./gal. NH_4Cl = cc. D x .0714.

Oz./gal. NaCl = cc. D x .0781.

Notes

1. The 50 cc. additions of solutions B and C may be made from 50 cc. graduates.

2. Solution A should be restandardized at least every two weeks as the cyanide gradually decomposes.

3. NaOH or KOH have not proved effective in stabilizing the NaCN.

4. The end-point when titrating with the cyanide solution may be detected more easily by directing a beam of intense light through the solution. If turbidity exists it is shown up by a luminous path in the solution.

Conclusions

The above method has proved to be short and accurate enabling an analysis to be completed in ten minutes. It eliminates the careful addition of ammonia with the attendant danger of adding an excess. In baths whose pH is less than 4.8, it may be found necessary to add slightly more ammonium hydroxide. Lastly, it enables a constancy of additions of water, indicator, etc. which promotes accuracy in end-points.

A Study of the Structure of Electro-Deposited Metals

By L. B. HUNT

FROM THE JOURNAL OF PHYSICAL CHEMISTRY, VOL. XXXVI, pp. 1006-1021, MARCH, 1932.
ABSTRACTED by DR. A. K. GRAHAM

A Critical Review of the State of our Knowledge of the Factors Which Influence the Structure of Electrodeposited Metals, and a Working Hypothesis to Account for the Observed Variations in Structure with Differing Conditions of Deposition and Amongst the Various Metals and their Salts

A NUMBER of theoretical views on this subject have been advanced from time to time, but . . . none of them has been found to account satisfactorily for all the phenomena . . . The views to be advanced are more in line with modern ideas on the condition in electrolytic solutions and in metallic crystals than any of the previously outlined theories. Up to the present, no attempt has been made to apply these recent views on interionic forces, ionic solvation, origin of potential and crystal structure to the study of electrodeposition, and the present paper is designed to point the way to a more complete correlation of the accumulated data on electrodeposition with these newer conceptions.

The Mechanism of Deposition

It will first of all be necessary to consider the precise manner in which a positively charged metal ion on reaching the cathode, becomes transformed into an "atom" of solid metal and takes its place in the crystal lattice. The views which have been advanced on this point fall naturally into two divisions —those postulating one instantaneous process of ion discharge and crystallization and those based on the conception of an intermediate state in which the ion or atom exists just prior to entry into the lattice.

Several writers, notably Hughes[1], acting on a suggestion made by Lehmann[2], have developed their views on the structure of electrodeposited metals by assuming an analogy with other forms of crystallisation. (The author concludes that the nearest approach to the process of crystallisation with which we are dealing is to be found in the electrolysis of fused salts although the absence of solvent destroys the analogy). The former author conceives a "metal atom concentration" at the cathode surface, and one is then asked to imagine a state of greater or less supersaturation in this layer of metal atoms. If supersaturation is great, rapid deposition of small crystals will result, as is the case with the crystallisation of a salt from solution. It is therefore necessary to assume that electrons enter a short distance into the solution to form metal atoms, and that these uncharged atoms then proceed in some way to the charged cathode, to form crystals the size of which is to be governed by the concentration of the atoms. The writer is not aware of any evidence on which these two assumptions can be justified.

Aten and Boerlaage[3] had previously put forward similar views with regard to the formation of metal atoms at a short distance from the cathode, and subsequent crystallisation from the resulting supersaturated solution, but they had also taken into account another factor, the change of polarization with current density.

Blum and Rawdon[4] then proposed their theory connecting the structure of electrodeposited metals with the cathode polarization during deposition, in which they assume that the ion discharge and metal crystallisation constitute one and the same process, an ion being discharged at a point on the cathode surface at which the lowest discharge potential is required.

Frolich and Clark[5] are also of the opinion that there is no intermediate stage in electrodeposition and that a single instantaneous process occurs.

Two other views which have been put forward with particular reference to the iron group metals must be mentioned. Kohlschutter[6] and his co-workers suggest that the discharged metal atoms remain in a dispersed state in a film of hydrogen for some finite period, after which they orient themselves to form crystalline structures. Glasstone[7] has advanced the view that the metal (nickel in particular) may be deposited in a labile state, due to the two electrons entering the 4-quantum orbit. This metastable form would then be transformed at a definite rate into the ordinary metal.

In 1928 Volmer[8] published an important paper, which has received little, if any, attention in this country (England), in which he suggested that deposition takes place by layers of atoms. Until a given layer is complete a certain proportion of the ions will find themselves in an intermediate state, between that of the original solution and that which they will eventually take up in the lattice. The observed polarisation phenomena are attributed to this retardation effect. Brandes[9] has further developed this view by assuming that an ion on entering the Helmholtz double layer will be deprived of its water envelope and will then seek out a convenient place on the lattice. The double layer will constitute a condenser, the potential difference in which will be proportional to the quantity of electricity brought up. The more easily an ion can find a suitable place for discharge the less will be the charge in the double layer, and hence the less the polarisation.

These two suggestions thus appear to fall into the "instantaneous process" class, although including the idea of some delay just prior to discharge. Present ideas on the phenomenon of ion discharge in general, and on the ionic nature of crystals would appear to support the conception of a single process of discharge and entry into the lattice. Further, the electrostatic attraction between cathode and cation will increase rapidly as the distance separating them decreases, so that any pause in the progress of the ion is difficut to imagine. Nevertheless, the existence of a double layer of dehydrated ions which are constantly being discharged and replaced cannot be ignored.

Nucleus Formation

On entering the field of the crystal lattice, the ionic atmosphere will be repelled—pushed to the rear of the approaching ion, and ultimately broken away. What will then prevent the ion from taking its place in an existing lattice, i. e., what will cause it to form the nucleus of another lattice? The possibilities are two in number. Either the formation of some kind of two-dimensional lattice, having a different orientation, immediately before discharge, according to Volmer's interpretation of the state of affairs, may lead to nucleus formation, or alternatively it may be supposed that during the time interval preceding the arrival of the ion, and after the arrival of the previous ion, some other body "(dipoles of water or undissociated molecules and colloidal particles)" shall have come to rest at this point on the lattice . . . Although this process is by no means unlikely, the frequency of its occurrence is probably quite small, depending on the interval between the arrival of ions at a given point on the lattice, and thus on the current density.

Hoekstra[12] has recently concluded that deposition occurs for most metals in films of approximately one thousand atoms in thickness. Any "two dimensional lattice" formed in this way will probably consist of dehydrated ions prior to discharge, as suggested by Volmer and Brandes. Even in this case, however, there will exist a strong tendency for the layer to follow the orientation of the surface layer of the cathode, and so to continue the crystal structure. Thus some sort of interference with crystal growth due to the inclusion of an electrolytically inert body is most likely as a cause of nucleus formation.

Crystal Growth

In the cases of crystallisation from the molten state or from solution, crystal growth can take place, once a nucleus has been formed, in all directions, or rather in all three planes. With electrodeposition, however, growth is largely confined to a plane normal to the cathode, but may also take place to a limited extent in a plane parallel to the cathode. The writer considers that it is necessary in discussing crystal growth of electrodeposited metals to differentiate these two forms of growth. In the case of growth parallel to the cathode plane, everything will depend upon the structure of the cathode surface and the behaviour of the initial lattice layers. . . In other words, deposition may take place entirely by crystal growth and with no nucleus formation whatever. The writer has found it necessary in preparing deposits of this type, to employ fairly high temperatures and low current densities; that is, to maintain a plentiful supply of metal ions to the cathode. It is apparent that, given a suitable metal ion supply, cathode structure will have a predominant affect in the growth of the deposit, and nucleus formation may be absent. If, however, the cathode structure is not favorable to reproduction, but the metal ion supply is well maintained, a fibrous type of structure will result due to growth taking place in a normal plane but not in a parallel plane. On the other hand, if the metal ion supply is at all restricted, nucleus formation will be pronounced whatever the cathode structure.

Crystal Orientation

Several workers have recently applied the methods of X-ray analysis to the determination of orientation in electrodeposited metals. After reviewing the work of a number of authors on this subject, the writer concludes that "the data on this point will clearly not yet permit of generalisations being made. Certain results are contridictory, but the fact emerges that preferred orientation is generally favored by slow deposition from dilute solutions.

This article will be continued in an early issue.—Ed.

The Preece Test for Zinc Coatings

STEEL coated with zinc, known as "galvanized steel", is extensively used where protection against atmospheric corrosion is required, for example, on roofings and gutters, fences, screens, hardware, and marine fittings. The zinc coatings may be applied by different methods, including: **(a)** Hot-dipping, in which the steel is dipped into molten zinc; **(b)** galvannealing, in which the hot-dipped coatings are subjected to heat treatment; **(c)** sherardizing, in which the steel is heated in zinc dust; **(d)** electroplating (also known as "electrogalvanizing"); and **(e)** spraying, in which atomized zinc is applied to the metal surface.

In all cases the useful life of the coated steel depends largely on the thickness of the zinc coatings, especially at the thinnest places. It is therefore desirable to have a method of inspection which will reveal the minimum thickness of the zinc coating. The Preece test has long been used for this purpose. In this test the zinc coated article is dipped into a solution of copper sulphate for successive periods of 1 minute each, with intermediate removal of loosely adherent copper until a firmly adherent deposit of copper is produced on appreciable area. The specimen is then reported as having withstood a certain number of "dips" in the Preece test. This method is widely used, although erratic results are sometimes obtained. The purpose of a recent study with zinc coated wires, described in RP688 in the June Journal of Research, of the National Bureau of Standards, Washington, D. C., was to find the cause and remedy for such difficulties.

It was found that the copper sulphate solution must be carefully neutralized, preferably with copper hydroxide instead of the copper oxide commonly used. The surface must be thoroughly cleaned both before the test and between the dips. Even with these precautions, zinc coatings produced by different methods dissolve at different rates, for which an allowance must be made in comparing results. With care, this test will yield reliable results for the minimum thickness and distribution of the zinc coatings.

Fall Meeting Institute of Metals Division

Hotel Pennsylvania, New York, October 2-4, 1934 During Metal Week

TENTATIVE TECHNICAL PROGRAM

Tuesday, October 2

9 a. m.—Registration.

10 a. m.—Institute of Metals Division.

Equilibrium Diagrams

An Investigation of the Mutual Liquid Solubility of Zinc and Lead with a Determination of the Eutectic Composition and Freezing Points by Thermal Analysis. By R. K. Waring, E. A. Anderson, R. D. Springer and R. L. Wilcox.

The High-zinc Region of the Copper-zinc Phase Equilibrium Diagram. By E. A. Anderson, M. L. Fuller, R. L. Wilcox and J. L. Rodda.

Equilibrium Relations in Aluminum-nickel Alloys of High Purity. By William L. Fink and L. A. Willey.

Secondary Structure and the Age-hardening of Certain Alloys. By K. H. Moore.

Wednesday, October 3

9:30-11 a. m.—Institute of Metals Division.

Die Casting

Effect of Compósition on Mechanical Properties and Corrosion Resistance of Aluminum-alloy Die Castings. By E. H. Dix, Jr., and J. J. Bowman.

Die Casting of Brass. By John R. Freeman, Jr.

Studies of the Phase Changes During the Aging of Zinc Alloy Die Castings and Their Technological Significance, I. The Eutectoidal Decomposition of the Beta Aluminum-zinc Phase and Its Relation to Dimensional Changes in Die Casting. By M. L. Fuller and R. L. Wilcox.

The Role of the Spectrograph in the Control of Die Castings Production. By T. A. Wright.

[Adjourning at 11 o'clock for **Campbell Memorial Lecture.**]

Wednesday, October 3

2 p. m.—Iron and Steel and Institute of Metals Divisions.

Die Casting and Other Hot Working Dies

Steels for Die-casting Dies. By Sam Tour.

Die Casting of Brass. By O. B. Malin and W. W. Sieg.

6:30 p. m.—Dinner, Institute of Metals and Iron and Steel Divisions Speaker, Sam Tour, Vice-president, Lucius Pitkin, Inc.; subject, "Die Casting."

Thursday, October 4

10 a. m.—Institute of Metals Division.

Theoretical Metallurgy

The Influence of a Grain Boundary on the Deformation of a Single Crystal. By Richard F. Miller.

The Effect of Quenching Strains on the Lattice Parameter and Hardness Values of High-purity Aluminum-copper Alloys. By Arthur Phillips and R. M. Brick.

An X-ray Study of Orientation Changes in Cold-rolled Single Crystals of Alpha Brass. By Carl H. Samans.

12:30 p. m.—Luncheon Meeting, Executive Committee, Institute of Metals Division.

2 p. m.—Institute of Metals Division.

Theoretical Metallurgy

Rates of Precipitation in Aluminum-rich, Aluminum-silver Alloys. By A. Hone.

The Correlation of Equilibrium Relations in Binary Aluminum Alloys. By W. L. Fink and H. R. Freche.

Intermetallic Solid Solutions. By E. R. Jette.

Conferences on Electroplating

These conferences will be held at the Hotel Pennsylvania, New York City, Wednesday, September 26, 1934, under the auspices of committees of the American Electroplaters' Society and the American Society for Testing Materials. All interested persons are invited to be present. This is the day preceding the meeting of the American Electrochemical Society, members of which are also invited to attend.

9 A.M.—Discussion of proposed specifications for plating of nickel, chromium, zinc and cadmium on steel.

2 P.M.—Discussion of proposed program for exposure tests of plating on non-ferrous metals including copper, brass, zinc, and die castings.

Inquiries regarding these meetings may be sent to the secretary of the Joint Committee on Specifications, Wm. Blum, Bureau of Standards, Washington, D. C.

Precipitating Gold

Q.—Can you inform me of the simplest and best method to precipitate an old gold plating solution to fine powdered gold. I wish to recover gold in the form of fine metalized powdered gold, to be used for making a gold paint. I also wish to do the same with an old silver cyanide plating solution.

A.—Use finely granulated zinc, or zinc shavings, in both cases. Simply add the zinc particles, preferably to a warm solution, and let it stand for some hours, stirring often. The zinc will dissolve, and metallic gold (or silver) will slowly deposit out in the form of a darkish powder.

If impurities such as copper are present, and they usually are, the deposited metal will be impure.

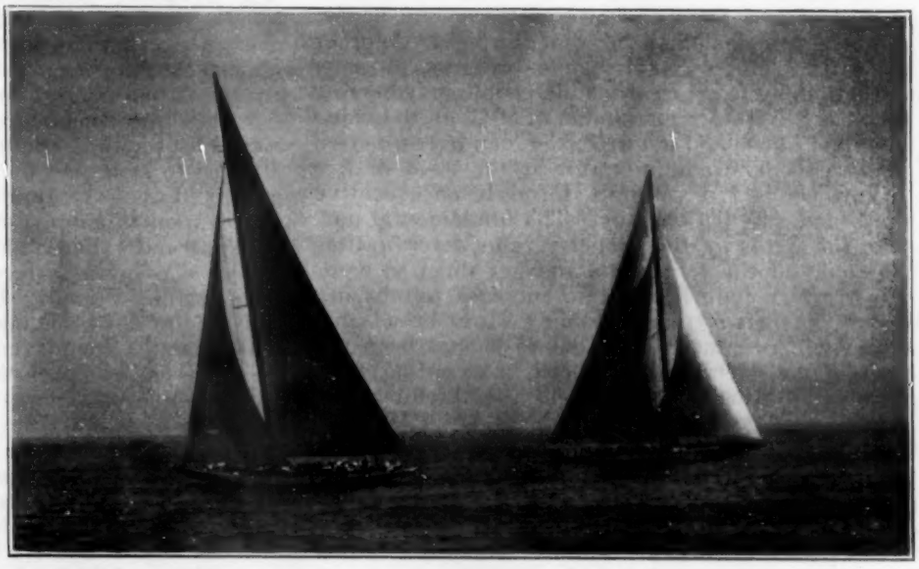
After you are sure that all the precious metal has been deposited, pour off or filter off the foul solution, which should be thrown away. The deposited metal must then be washed very carefully, to get rid of any remaining cyanide, which as you know is very poisonous.—**Jewelry Metallurgist.**

Cup Defenders Use Large Quantities of Metals

The cup defenders at the time of writing, have narrowed down to two yachts—the Rainbow and the Yankee. The Yankee is an old yacht, having competed for the honor of defending America's Cup in 1930. Like all other yachts of this class, she has a polished bronze plate over her hull bottom and of course, a huge quantity of lead in her keel. Her mast has tank fittings of Monel metal.

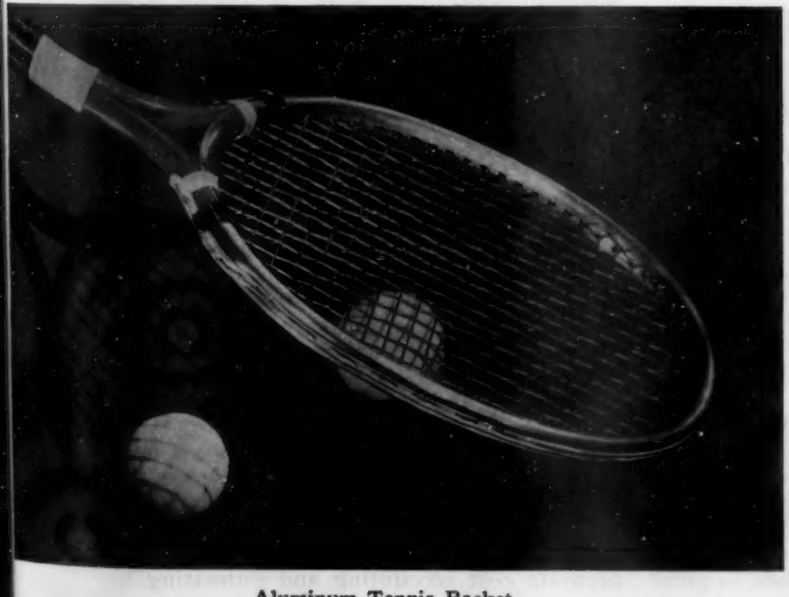
The newly built Rainbow is unique for her use of extraordinary quantities of non-ferrous metals. Her hull has the usual smooth bronze plates on the bottom. Her mast is of a special aluminum alloy of slightly different composition from that of the Enterprise, which defended the cup successfully in 1930. Her keel contains 80 tons of lead.

The challenger, the Endeavour, is built entirely of steel plates. She has a lead keel weighing 82 tons.



The Rainbow Leading the Yankee Around the First Mark in the 30 Mile Trial Race off New Port, R. I., August 27th.

Keystone View Company Photo.



Aluminum Tennis Racket

A Straight Racket

WHEN you feel the urge to go out and knock a few round the lined court, it would be rather nice to have one of the aluminum tennis rackets which have been placed on the market by the Tru-Flite Company of Los Angeles.

Both professional players and "Simon Pures" state that the aluminum racket has all the desirable qualities of the wooden article but does not need a press. It has a permanent shape. Made of strong alloy tubing, handsomely enameled, it has balance and the very necessary "feel."

It's called the "Whippet" (A fellow having forgotten the name, asked for "that doggy" racket) and may be had in all popular grips, weights and stringing.

This is one "Racket" any one can get in on!—**Aluminum News-Letter.**

EDITORIALS

Metals and the Housing Act

THE National Housing Act recently passed as one of the few measures which seems to have the approval of practically the whole country. By the terms of this Act, a blow has been struck to improve the homes of an estimated 3,000,000 people and to improve the business of 4,000,000 more whose livelihood depends upon building.

The program, briefly, consists of a drive to repair and re-model all types of buildings (stores, garages, office buildings and homes). Up to $2,000 may be borrowed at low rates and on easy terms by people of financial responsibility for that purpose. Another phase is the long term mortgage program for new construction, by which responsible people may borrow as much as $16,000 at a maximum of 80% on the value of land and house and amortize the loan over a period of 20 years. The administrator at the head of this entire project is J. F. Moffett, formerly an executive of the Standard Oil Company. The fundamental purpose of the Act is to stop property value deterioration, take people off the relief rolls and get them to work in constructive industry and to increase purchasing power by increasing employment. How broad this program will eventually turn out to be has been the subject of considerable guesswork. According to a summary published by Time and the Architectural Forum, it may range from $500,000,000 to $1,500,000,000 in repairs and remodeling by the end of 1934.

The details of the Act, the methods of financing through regular banking institutions with the possible losses insured by the Government are too long to give in detail here. Of primary importance to our industries is the fact that Government aid is being pressed directly in an industry which is suffering as much as, if not more than, any other. Repairing and remodeling and putting in good condition the dwellings of the United States will mean a huge total of business for metal products. Brass piping, plumbing fixtures, hardware and an enormous amount of plating and finishing work will go into these products.

Of special interest is the advice in the bulletin mentioned above, to such manufacturers:

(1) Get in contact as quickly as possible with dealers and jobbers pointing out to them the opportunities which the National Housing Act opens to them and make every effort to have products available locally to meet the expected demand.

(2) Manufacturers whose own stocks are low should without delay make sure how much business will develop from this source during the next few months and adjust their production schedules accordingly.

(3) Inform the manufacturers' salesmen fully of the provisions of the Act so that they may interpret them to the trade and to home owners whom they meet.

(4) These salesmen should co-operate with the campaign in their territory helping dealers and contractors to close sales and work with local committees.

(5) Bear in mind that this is a good time to press an advertising campaign because a new and unexpected market has been opened.

(6) Tie up this advertising to the National Housing Administration Program.

We urge metal products manufacturers strongly to climb aboard this band-wagon without delay. There is room for all.

Flat Price Quotations

DURING the last few hard years a practice has grown up in the foundry industry, caused in part by the pressure of slack business and in part by the sharpness of purchasing agents, which has, for lack of a better name, been called "flat price quoting." It consists briefly, of quoting a single price for all of the work of any concern over a given period. It is not done absolutely "sight unseen". The foundryman is allowed to look over the products of the company and get an idea of the type of castings which he will be called upon to supply. Consequently, he figures that he knows the line and is in a position to estimate fairly. To quote a recent communication from the Non-Ferrous Foundry Industry Code Authority, the principle of flat price quoting is based upon the belief that what the foundryman loses on small or intricate work, he makes up on large or simple work, and that on the whole, the average is fair.

Obviously, this is the roughest kind of guesswork. It is impossible for the foundryman to know which type of his customer's products will sell best. In the majority of cases, the customer himself cannot be sure, so what chance has the foundryman? For that reason the code in this industry has prohibited flat price quoting. This prohibition has been in effect since December 25, 1933. The reason for its inclusion is basic—that it is unfair to sell below cost. It is inevitable that in quoting a flat price for a wide variety of castings, the quotations must be below cost on certain of these castings.

An attempt has been made to evade the spirit of the Code by quoting only a fraction of a cent differential between castings of widely varying weight or intricacy, but the Code Authority has ruled, justly, that it is necessary for foundrymen who quote in this fashion, to prove by actual cost records that they are able to produce these small or intricate castings at the prices quoted.

The Code Authority has a committee working on a classification of castings as to weight and intricacy, which will be ready in the near future. The Code Authority Cost Committee has developed a proposed standard cost accounting and estimating system, which is being distributed to the various divisions of the industry and will be discussed at the coming meeting on September 19-20 in Chicago. A copy of this system appears on page 297 of this issue.

It behooves non-ferrous foundrymen to study this material intensively. The object of the Code Authority is not to swing a club. It is to teach foundrymen something that they have always needed to learn—accurate cost accounting and estimating.

What Is Under the Plate?

IT is an old story that when a plated article becomes discolored or peels, it is the plater's fault. If the article blisters or becomes spotted, discharge the plater. The unfortunately wide acceptance of this idea among manufacturers dates back to the time when plating was done by guess and by gosh, when the manufacturer or production head knew nothing about plating, and most platers knew very little more.

In recent years, plating has improved in appearance, in uniformity and in wearing qualities, due, it is perfectly fair to state, to the efforts of the platers themselves through the American Electroplaters' Society chemists through that organization, The National Bureau of Standards and the Electrochemical Society. Platers have evinced their willingness to put into practice technical methods of control and testing.

But there is another element in the situation, which has been largely overlooked because of the perfectly simple fact that it is hidden under the surface, namely, the base metal. How does the base affect the plate?

One of the prominent figures in the electroplating industry, George B. Hogaboom, has commendably made strenuous efforts to point out to platers and manufacturers, the importance of the base material. In a paper which he read at the last meeting of the American Electroplaters' Society in Detroit, he pointed out that electroplates are put on iron, steel, zinc, copper, brass and other metals and alloys, with very little knowledge about the affect of the base metal upon the strength and durability of the deposited metal. The fact is overlooked that metals are composed of crystals, that seem under certain conditions to be almost alive. Strains are set up when the metal is cold worked and these strains often assert themselves unless they have been removed prior to finishing. A large grained, weak structure is treated in the finishing department exactly the same as a fine grained and strong but highly strained material. Under some forming operations, the external structure is deformed and yet such steel is sent to the plating room to be given a protective coat or an ornamental finish that must be perfect.

It is easy to set jobs for others. It is a simple matter to criticize and to tell others what to do. For that reason, we hesitate to load additional jobs on an industry which has enough to contend with, particularly at this time. But we are convinced that the electroplating industry has become increasingly aware of the importance of the condition of the material with which it must work. There is a fertile field for investigation in the condition of the base metal, and its proper preparation for electroplating. With fair and reasonable standards set for the base, the metal manufacturing industry will find itself repaid many times over in the elimination of waste and spoilage.

Silver Nationalized

ON August 9th, silver was nationalized as a base for currency by Presidential order. All stocks of silver in the United States must be turned into the Mints within 90 days, with the exception of coins, fabricated silver, metal under licenses or owned by foreign Governments and central banks and small supplies held for value as bullion. Such silver will be paid for at a net price of 50.01c per ounce. Newly mined domestic silver will continue to be paid for at 64½c per ounce.

The immediate result of this order was suspension of trading in silver contract by the Commodity Exchange and the bank fixing of the market price of silver at 49.75. There is no longer speculation in this commodity. There were other effects such as the fall in the American dollar (which has since recovered). Both of these seem to have had negligible, if any results, on general business.

Proponents of "free silver" continue to promise untold improvement as the direct result of monetizing silver. We await said improvement with more than ordinary interest. We also reserve the right to doubt it. As far as we can see, the juggling with silver has done no harm and no widespread good. We hope that nothing worse comes of it.

A Great Metallurgist

LACK of time and space prevented us from giving, in our last issue, anything more than a concise report of the death of William Hastings Bassett, Metallurgical Manager of the American Brass Company.

Mr. Bassett was a pioneer in the application of scientific methods to the practical manufacturing of copper base alloys. He started at the bottom of the industry as a chemist at a time when chemists were looked upon with contempt by the so-called practical operators. They were "theorists", who knew nothing about making brass. Only after years of unremitting effort in which he did so much to develop the high quality of brass and of refined copper and zinc for making alloys, was his work broadly recognized. He was among the first in the United States to apply the microscope to the manufacturing of alloys and later in his career, the spectroscope.

Recognition came to him as he deserved. He was an outstanding member of a number of technical and scientific societies, giving without stint of his efforts. He was honored by high offices, having been chairman of the Institute of Metals Division, president of the American Institute of Mining and Metallurgical Engineers, and at the time of his death, president of the American Society for Testing Materials. In 1925 he received the James Douglas Medal of the American Institute of Mining and Metallurgical Engineers.

His personality can be described in no better fashion than in the eulogy delivered at his funeral services. "He was a man of parts—of a fine mind, a well balanced judgment and an ample fund of common sense. He was an honorable man, high principled, broad-minded, large hearted and kindly affectioned."

A great metallurgist and man has passed on.

Platers' Code Approved

THE Code of Fair Competition for the Electroplating Industry was approved on Wednesday, August 22nd. The basic provisions of the Code are the same as in the Code for the Fabricated Metal Products Industry of which electroplating is a part. Full details of the platers' code will be published in our next issue as we hope by that time to have received copies.

The Master Electroplaters' Institute of the United States is to be congratulated on its success. Hard as the work has been in the past, however, still more and harder work remains to be done in the enforcement of the Code. For this work it needs the support of every job plating shop in the United States. Let every plater do his part.

Correspondence and Discussion

The National Budget

To the Editor of **Metal Industry:**

It has occurred to writer when reading your editorial on "A Balanced Budget" in your May issue, that you have completely lost sight of the war debt situation.

One must recall that the United States Government is paying interest to private parties for money loaned to European nations by the United States and which debts are in most cases in default or completely ignored.

In other words, it would be of considerable assistance to us in balancing our budget if the United States Government did not have the mill-stone of paying interest to private parties on the above loans—while the borrowers do not pay their share. The money which the United States Government pays to the private parties on the above loans throws our budget out of balance that much further—while very little is received from Europe to alleviate this situation.

In order to balance our budget may it not be necessary at a future date to tax the American people to pay off the interest on the war debt money which we loaned to other countries —not to say anything about the principal?

Without a doubt, we in the United States should be very conscious of the war debt situation and not lose sight of the tremendous effect this has on our present and future generations. Some way or means should be devised that we secure the equivalent of the money loaned—if not the actual money itself.

When the British Government made up their budget for the current fiscal year, it was noted by various writers that absolutely no provision was made in the same for any payment on either principal or interest on the war debts. Under such conditions balancing of budgets can be made extremely simple. Taking all these points into consideration, might not your editorial be misleading?

M. E. Enright

Pittsburgh, Pa.

One of the items in the national budget is for interest on the Government debt. This includes all of the sums borrowed, a part of which were later loaned to foreign governments. In other words, we are now, and have been, paying in our taxes, the interest on these foreign loans.

The payments due from foreign governments are a comparatively small sum annually (about $275,000,000) compared to the entire budget. Even if these payments were regularly made, the budget would be over $3,000,000,000 short of a balancing.—Ed.

New Books

America's Capacity to Produce. By Edwin G. Nourse and Associates. Published by the Brookings Institute, Washington, D. C. Size 5 x 8, 608 pages. Price $3.50.

This volume is the first of a series on the general subject of the distribution of wealth in relation to economic progress. Its specific purpose is the investigation of the generally accepted statement that America has such a huge excess industrial capacity as to make our economic structure impossible of efficient operation.

The authors have divided their investigation by grouping production facilities under large heads: Agriculture, Coal and Coke, Petroleum, Copper and other Non-Ferrous Metals, Cement, Food Products Manufacture, Textiles and Clothing, Automobiles and Tires, Paper Making, Printing and Publishing, Iron and Steel, Machinery of Various Types, Building Materials, Chemicals, Electric Power Utilities, Transportation, Merchandising, Money and Credit and the Labor Force Available.

Lack of space forbids a detailed analysis of the book, but an abstract of its conclusions is given below.

The authors find that the margin of unutilized plant capacity in the various branches of industry did not expand during the period 1900 to 1930.

In the peak year of 1929, our American plants were operating at a total of about 81 per cent of capacity.

In the same year there was about 20 per cent of reasonable available labor which was not turned into the production stream.

The authors estimate that our total productivity could have been increased only about 19 per cent from the peak in 1929 with the plant capacity available.

Technical Papers

Solving Corrosion Problems with Ceramic Materials. By J. M. W. Chamberlain, Manager Engineering Department, United States Stoneware Company, Akron, Ohio. Obtainable from that company.

Legal Aspects of the Dust Problem. By Alfred C. Hirth, attorney of Toledo, Ohio. Obtainable from the Northern Blower Company, Cleveland, Ohio.

Comparative Performance of Watches with Elinvar and with Steel Hairsprings. By Ralph E. Gould, Bureau of Standards, Washington, D. C. Research Paper RP670.

Abstract: The performance of watches having the usual cut, bimetallic balance wheels and steel hairsprings is compared with that of watches having uncut, monometallic balance wheels and elinvar hairsprings. The latter combination of vibrating assembly is a new application intended to improve the general performace of watches.

Twenty watches of each type, 10 each of 2 makes, were given performance tests at temperatures encountered in ordinary use. The temperature-rate errors of the watches having the new vibrating assembly were less than those for watches having the ordinary assembly, and instead of the usual parabolic curve, a curve approaching a straight line was obtained. Marked improvement in performance at temperatures within the usual temperature range 5 to 35 C is indicated by the use of the new assembly.

The new assembly almost entirely overcomes the effects of magnetism so that, after the watch is removed from a magnetic field, the rate is not subject to fluctuations experienced with the ordinary assembly.

There is no evidence of any marked difference in performance of the two types of watches in different positions or for isochronism.

Government Publications

United States Government publications are available from the Superintendent of Documents, Government Printing Office, Washington, D. C., to whom proper remittance should be made to cover price where a charge is mentioned. In some cases, as indicated, apply to governmental body responsible for publication.

Platinum and Allied Metals in 1933. Advance Summary. U. S. Bureau of Mines, Washington, D. C.

Copper Industry in 1933. Advance summary issued July 13, 1934. Obtainable from the U. S. Bureau of Mines, Washington, D. C.

Shop Problems

This Department Will Answer Questions Relating to Shop Practice.

Copper Solution—Correction

In our August issue, on page 281 under the title Defective Copper and Nickel Solutions (Problem 5,314) the last paragraph began as follows:

"The free cyanide content is too high."

This was a typographical error. It should have read " . . too low." This point is made clear in the following sentence which recommends the addition of ¾ oz. of sodium cyanide to each gallon of solution.—Ed.

High Tensile Metal

Q.—From time to time we receive orders for castings that must conform to U. S. Navy Specification 46 M6e, which specifies 86 to 89 copper, 7.5 to 11.0 tin, 1.5 to 4.5 zinc, 0.30 lead maximum, .75 nickel maximum, allowable traces of phosphorus, sulphur, antimony, etc.; tensile strength 40,000 minimum; elongation in 2 inches, 20%.

We have a great deal of trouble meeting this specification with respect to the tensile, and while we occasionally make it, the average tensile of our metal will come nearer to 34,000 or 35,000.

We have been using mixtures as follows:

Copper 86½	Copper 87¼	Copper 87¼
Tin 8½	Tin 10	Tin 7½
Zinc 4½	Zinc 2¼	Zinc 4½
Nickel ..¾ of 1% with ¼ of a lb. of 5% Manganese Copper added to the 100.	Nickel ..... ¾ 5% Manganese Copper ..... ¼	Nickel .¾ of 1% with ¼ of a lb. of 5% Manganese Copper added to the 100.

and several other similar variations within the prescribed limits.

We have repeatedly gotten percentage of elongation running from 25% to 35%, but the tensiles have only in one case out of seven tests been over 40,000. The majority, as mentioned above, have been 34,000 or 35,000.

The type of test bar used is a standard Weppart bar as prescribed by the United States Government.

The average pouring temperature has been 2180°.

Can you help us?

A.—On the specification 88 copper, 4 zinc and 8 tin, (the desired) and allowed, as you state, 86 to 89 copper, 7.5 to 11 tin, 1.5 to 4.5 zinc, .30 lead maximum, 0.75 nickel maximum, allowable trace of phosphorus, 40,000 minimum elongation in 2" 20 per cent. This mixture should be capable of meeting these requirements.

USE THIS BLANK FOR SOLUTION ANALYSIS INFORMATION

Fill in all items if possible.

Date.....

Name and address: .....**Employed by:** .....

Kind of solution: .....**Volume used:** .....

Tank length: .....**width:** .....**Solution depth:** .....

Anode surface, sq. ft.:.....**Cathode surface, sq. ft:** .....

Distance between anode and cathode: .....**Kind of anodes:** .....

Class of work being plated: .....**Original formula of solution:**.....

REMARKS: Describe trouble completely. Give cleaning methods employed. Send small sample of work showing defect if possible.

Use separate sheet if necessary. _____

_____

_____

_____

NOTE: Before taking sample of solution, bring it to proper operating level with water; stir thoroughly; take sample in 2 or 3 oz. clean bottle; label bottle with name of solution and name of sender. PACK IT PROPERLY and mail to METAL INDUSTRY. 116 John Street, New York City.

You do not state how you handle this metal or the grade of material you use to meet the physical requirements of this specification.

We suggest the following. Use electrolytic ingot copper, Straits tin, prime western slab zinc, or its equivalent. Melt your copper first, put in the zinc and stir thoroughly, then put in the tin and stir as before. If you use nickel, charge it with your copper in the form of copper-nickel. If you use manganese copper, add it after all the mixture has been put into the crucible, and stir.

Without doubt you will get better bronze and your loss will be considerably less. We claim that any metal with 1% of alloy needs as much stirring as a composition with 20 to 30% alloy. No matter what composition is being made take the ingredients that melt at the highest temperature, such as nickel copper and all heavy metal. Stir well, then put in as stated above, the zinc, tin or lead as the case may be.

When all the ingredients are in, the metal should be thoroughly stirred from the bottom of the crucible as it is important that the heavy metal should be mixed with the lighter portions on top. This is the failing of a great many men, they do not stir enough and thereby make lots of trouble when physical tests are required. This is done mostly for want of thought as most men would stare with astonishment if told they did not stir their metal enough, but it is a fact and I have seen more trouble over this one thing than any other in connection with melting metal.

We suggest that you follow this plan and see that it is carried out. Add a spoonful of salt to the metal just before pouring, and we feel you will meet the physical requirements. Another thing that will help is to make your test bar in dry sand, using core sand, and bake in the oven. This, however, we do not think will be necessary if good material is used and the stirring is looked after.

W. J. R., Problem 5,316.

Steel Tanks for Brass

Q.—Will you kindly advise me if it is all right to use a brass solution in a steel tank to brass plate steel parts which are to be rubber covered?

A.—An iron tank can be used very satisfactorily for a brass solution. If a coil is used for heating the solution, it should be thoroughly insulated, and the cathode and anode rods should also be insulated where they come in contact with the tank. O. J. S., Problem 5,317.

Nickel on Screws

Q.—Have enclosed some screws which were nickel plated. These screws have a very white deposit which I want to duplicate.

Could you give me some idea of how to produce the same finish or rather how these screws were processed?

Also the nickel solution used, how many lbs. could be plated in 100 gallons of solution and how long they were plated.

A.—The method of producing the finish on the sample screws is as follows:

The first operation is to remove the grease and dirt, and then steel ball burnish, after which they are barrel plated in a nickel solution.

The nickel solution should contain 4 to 5 ozs. of metallic nickel, 5 to 6 ozs. of chlorides, and a pH of 6 or 6.2. Cadmium has been used as a brightener.

With the proper type of a plating barrel, 50 to 75 pounds can be plated at a time. Using 6 to 8 volts, the length of the plating time will be about 30 minutes.

The sample screws with the wire attached have been chromium plated after nickel plating. O. J. S., Problem 5,318.

Etching Steel

Q.—Kindly advise if you can give any information concerning electro-etching of steel. We are interested in engraving it to a depth of .055 to .075 in. Due to the type of designs required it would be quite advantageous to apply the resist photographically and we are experiencing some difficulty in obtaining one (a resist) which will stand up under any of various methods of etching.

A.—We would suggest that you use a 10% solution of hydrochloric acid with water for an electrolytic etch on steel, and for the resist use equal parts of damar white varnish and asphaltum varnish.

Use lead cathodes and an anode current density of 8 to 10 amperes per sq. ft.

A good etching fluid for steel is made by using 30% of nitric acid, 70% of water, and for each liter of this mixture add 40 grams of mercury nitrate. This etching solution is not to be used with the current. O. J. S., Problem 5319.

Casting Bell Metal

Q.—We have recently been casting some 12″ diameter bells for use on fire apparatus. The mixture we use contains 75% copper and 25% tin. We have had some difficulty in getting a sound casting free from surface pits and imperfections. This is really essential as the bells are highly polished all over on the outside and in some cases are plated. After these bells have been cast, sometimes a week or so later, they will develop cracks from the center out at the top as many as three or four on one casting. If you have any data as to foundry practice or any methods of heat treating these castings, we would appreciate it very much if you would send us this information.

A.—The principal requisite of good bell metal is a pure, full sound which is only obtained with an alloy showing homogeneousness and hardness, also considerable degree of strength. It has been said these qualities are obtained with a composition containing 20 to 22 per cent tin. We suggest you use 22% tin.

The bell foundries use the fracture test on bells. If the fracture is too fine the alloy is too rich in tin. If too coarse it contains too little tin. The melting and casting of bell metal is not difficult. The copper is first melted. Use borax as a flux. After the copper is melted, add the tin a little at a time, and by stirring the metal vigorously, the tin forms a union with the copper. It is good practice to add 2/3 of the tin and wait about ten minutes before adding the balance.

Bell metal is brittle and cracks under the hammer cold as well as heated. The brittleness can be overcome by heating to a cherry red heat and plunging into water and allowing to cool, after which it will be found tough.

We suggest that the metal be cast in ingot first and remelted for casting the bells, using borax, salt and silica sand as a cover, approximately 1/3 of each. This method should overcome your difficulties. W. J. R., Problem 5,320.

Brownish Silver Deposit

Q.—I have a silver solution which gives trouble. The tank is 72″ x 26″ x 31″. I use 8 anodes, 6″ x 8″. Distance between anode and cathode, 12″. The work consists of musical instruments. The solution gives a brownish deposit.

A.—Analysis of silver solution:

Metallic silver	1.43 ozs.
Free cyanide	2.53 ozs.

Solution is low in metal. We would suggest that you add 250 ozs. of silver chloride and 500 ozs. of sodium cyanide to the solution. Operate solution by using ¼ to 1 volt.

O. J. S., Problem 5,321.

Patents

A Review of Current United States Patents of Interest

Printed copies of patents can be obtained for 10 cents each from the Commissioner of Patents, Washington, D. C.

1,952,082. March 27, 1934. **Alloy.** Robert H. Leach, Fairfield, Conn., assignor to Handy & Harman, New York, N. Y.

1,952,083. March 27, 1934. **Alloy.** Robert H. Leach, Fairfield, Conn.

1,952,201. March 27, 1934. **Apparatus for Casting.** John Flammang, University City, Percy L. Bowzer and Herman Ernst, St. Louis, Mo.

1,952,634. March 27, 1934. **Buffing Machine.** Wiliam M. Spry, Beachmont, Mass.

1,952,760. March 27, 1934. **Metallic Coating Apparatus.** Niels Lang, Lakewood, Ohio.

1,952,793. March 27,1934. **Process of Electroplating Chromium.** Dwight T. Ewing, East Lansing, Mich.

1,952,842. March 27, 1934. **Welding Rod Alloys.** Joseph Henry Doss, Detroit, Mich.

1,952,850. March 27, 1934. **Method and Apparatus for Galvanic Deposition of Copper and Other Metals.** William Koehler, Cleveland, Ohio.

1,953,003. March 27, 1934. **Heat Treatment of Light Metals.** Josef Martin Michel, Bitterfield, Germany.

1,953,330. April 3, 1934. **Means for Coating with Metal.** Felix O. Andres, San Francisco, Calif.

1,953,484. April 3, 1934. **Method of Chromium Plating.** Charles V. Iredell, East Orange, N. J.

1,953,758. April 3, 1934. **Cast Anode.** George B. Hogaboom, New Britain, Conn.

1,953,844. April 3, 1934. **Cast Type.** Wilson S. Yerger and Lewis S. Somers, Philadelphia, Pa.

1,953,866. April 3, 1934. **Apparatus for Investing Dental Casting Patterns.** David W. Phillips, Chicago, Ill.

1,953,936. April 10, 1934. **Method of Treating Metal.** Bernard H. Jacobson, Charleston, W. Va.

1,953,955. April 10, 1934. **Means for Electroplating Interior Surfaces.** Edwin M. Crouch, United States Navy.

1,953,997. April 10, 1934. **Anodic Coating of Zinc Base Metals.** Edward Cushman Truesdale and Ernest John Wilhelm, Palmerton, Pa.

1,953,998. April 10, 1934. **Anodic Coating of Zinc Base Metals.** Edward Cushman Truesdale and Ernest John Wilhelm, Palmerton, Pa.

1,953,999. April 10, 1934. **Anodic Coating of Zinc Base Metals.** Edward Cushman Truesdale, Ernest John Wilhelm, and Claude Edward Reinhard, Palmerton, Pa.

1,954,000. April 10, 1934. **Anodic Coating of Zinc Base Metals.** Edward Cushman Truesdale and Ernest John Wilhelm, Palmerton, Pa.

1,954,003. April 10, 1934. **Copper Alloy for Chill and Die Casting.** Eugene Vaders, Eberswalde, Germany.

1,954,168. April 10, 1934. **Solder.** Owen W. Ellis, Toronto, Ontario, Canada.

1,954,180. April 10, 1934. **Method of Hardening Cast Articles.** Fred E. McCleary, Detroit, Kurt C. Babo, Clawson, and Harry Rayner, Detroit, Mich.

1,954,263. April 10, 1934. **Polishing or Buffing Wheel.** Don H. Ross and Lawrence J. Nook, Kalamazoo, Mich.

1,954,316. April 10, 1934. **Method for the Recovery of Silver From Used Photographic Fixing Solutions by Electrolysis.** Kenneth C. D. Hickman and Walter J. Weyerts, Rochester, N. Y.

1,954,353. April 10, 1934. **Material for Decorating Surfaces.** Arthur H. Ernst, Woodbridge, N. J.

1,954,356. April 10, 1934. **High Pressure, High Temperature Heat Exchanger.** Harlan W. Howe, Warren, Pa.

1,954,390. April 10, 1934. **Glaze or Enamel.** Kenneth E. Long, Cleveland, Ohio.

1,954,394. April 10, 1934. **Welding Rod.** Louis A. Meisse, Mansfield, Ohio.

1,954,462. April 10, 1934. **Metallic Paint.** Urlyn C. Tainton, Baltimore, Md.

1,954,463. April 10, 1934. **Refining White Metal Scrap.** Gustave W. Thompson, Sayville, and Edmund H. Sheaff, Brooklyn, N. Y.

1,954,473. April 10, 1934. **Electrochemical Process for Removing Scale and Oxide From the Surface of Stainless Steel.** Thomas E. Dunn, Bridgeport, Conn.

1,954,775. April 10, 1934. **Die-Casting Machine.** William J. During, Syracuse, N. Y., and Nathan Lester, Cleveland, Ohio.

1,954,835. April 17, 1934. **Crystallizing Varnish.** William O. Stauffer, Wilmington, Del.

1,954,836. April 17, 1934. **Protective Coating Composition.** Victor H. Turkington, Caldwell, N. J.

1,954,950. April 17, 1934. **Apparatus for Metallically Coating Phonograph Records.** Alexander G. Russell, Red Bank, N. J.

1,954,951. April 17, 1934. **Method and Apparatus for Refining Metals.** Ronald C. Rutherford, Chilhuahua, Mexico.

1,954,995. April 17, 1934. **Process for Metal-Coating Phonograph Records.** Henry C. Harrison, Port Washington, N. Y.

1,955,072. April 17, 1934. **Device for Introducing Superposed Plates of Different Metals.** Franz Jordan, Berlin-Charlottenburg, Germany.

1,955,078. April 17, 1934. **Coating Forming Device.** Willett J. McCortney, Royal Oak, and Edgar L. Bailey, Birmingham, Mich.

1,955,243. April 17, 1934. **Method of Producing Seamless Tubes by Extrusion.** Alfred Liebergeld, Laufamholz, near Nuremberg, and Fritz Singer, Nuremberg, Germany.

1,955,459. April 17, 1934. **Casting Apparatus.** Clarence W. Hazelett, Rocky River, Ohio.

1,955,572. April 17, 1934. **Art of Metal Coating Bodies.** Jacob Adler and Paul Doerseln, Paterson, N. J.

1,955,576. April 17, 1934. **Process for Treating Metals.** Lawrence R. Clapp, Woodbury, and Richard O. Farmer, Seymour, Conn.

1,955,726. April 24, 1934. **Method of Melting Copper to Produce Dense Castings Low in Oxygen.** Robert S. Archer, Whitefish Bay, and Milan A. Matush, Milwaukee, Wis.

1,955,816. April 24, 1934. **Galvanizing Kettle.** Clarence J. Lemont, South Milwaukee, Wis.

1,955,936. April 24, 1934. **Foundry Facing and Method of Making Same.** Benjamin F. Wallace, Brooklyn, N. Y.

1,955,981. April 24, 1934. **Method of Casting Metal Fixtures on Glass Articles.** Rowland D. Smith, Corning, N. Y.

1,955,991. April 24, 1934. **Aluminum Alloy.** Ludwig J. Weber, New Kensington, Pa.

1,956,002. April 24, 1934. **Die Casting Machine.** George W. Bungay, Plainfield, N. J.

1,956,251. April 24, 1934. **Copper Alloys.** William B. Price, Waterbury, Conn.

1,956,266. April 24, 1934. **Antifreeze Noncorrosive Solution.** Julius F. T. Berliner, Wilmington, Del.

1,956,462. April 24, 1934. **Method of Making Composite Strips.** Edward C. Knuth, Cleveland, Ohio.

1,956,464-70 inclusive. April 24, 1934. **Bearing Manufacture.** John V. O. Palm, Cleveland Heights, Ohio.

1,956,471. April 24, 1934. **Method of and Apparatus for Producing Bimetallic Strips.** John V. O. Palm and George S. Salzman, Cleveland Heights, Ohio.

1,956,553. May 1, 1934. **Composition of Matter and Method of Making the Same.** Arthur D. Atkin, Woodland, Calif.

1,956,625. May 1, 1934. **Work Carrying Arm for Plating Machines.** Arthur William Ritter, New Haven, Conn.

1,956,905. May 1, 1934. **Preformed Abrasives, and Process of Producing the Same.** Edmund S. Merriam, Marietta, Ohio.

1,956,907. May 1, 1934. **Method of Casting.** Theodore A. Miller, Akron, and George T. Williams, Silver Lake Village, Ohio.

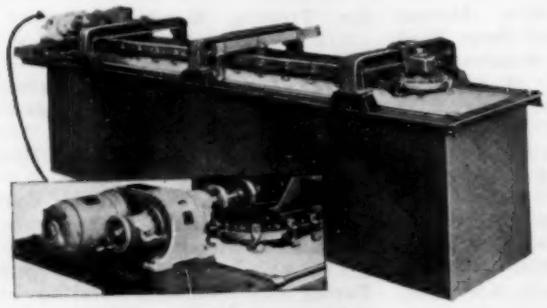
1,956,910. May 1, 1934. **Method for Casting Blocks of Metal.** Ernst Roth, Lautawerk/Lausitz, Germany.

Equipment

New and Useful Devices, Metals, Machinery and Supplies

Variable Speed Plating Machine

A new plating machine which is operable at variable speeds has been developed by the Meaker Company, 1629 S. 55th Avenue, Chicago, Ill. This machine has been designed for heavy duty and great flexibility. It is pointed out that the close coupled enclosed variable speed drive is highly advantageous. Turning the small hand-wheel gives infinite variations in speed, which are shown by the Microspeed Indicator. In this way, it is stated, the plating period may be controlled to the smallest fraction of a minute.



Meaker Variable Speed Plating Machine

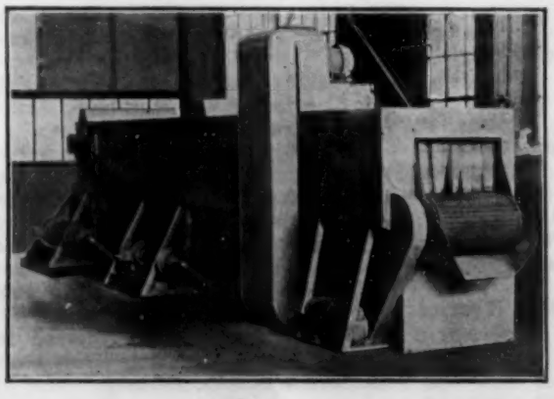
Metal Parts Washing Machine

A new continuous type washing machine for cleaning metal parts—stampings, castings, forgings and machined parts—has been introduced by N. Ransohoff, Inc., Cincinnati, Ohio. Work enters the machine from a belt or chute and travels through the equipment on an endless woven wire conveyor. This flexible mesh belt, with double selvage edges, runs over drums at loading and unloading ends, is supported by track and rollers and makes the return trip within the housing, thus preventing the water from dripping to the floor. The work travels through the conveyor tunnel at the rate of 20 ft. per minute.

Five operations are involved in cleaning the parts—a wash, drain, rinse, second drain and drying. Washing compound and rinse water are sprayed onto the work from top and bottom through perforated pipes which extend from the sides of the machine for ease in cleaning. Cleaning compound is pumped from a tank in the bottom of the machine equipped with skimming dam to eliminate scum. The compound is heated by steam coils on three sides of the tank.

The rinse water tank is served by an individual pump, has a skimming dam and is heated by the exhaust from the wash tank through perforated pipes extending from the steam coils.

Following the rinse the work is given a final spray with hot water from the plant's regular water line. It then is subjected to blasts of hot air from slotted pipes above and below the conveyor, the air circulating back to the steam coils for re-heating and provision is made for controlling the amount of fresh air drawn in. Four motors drive wash pump, rinse pump, blower and conveyor.



Ransohoff Metal Parts Washing Machine

In one plant where this washer has been placed in operation it is cleaning a wide variety of work including large stamped parts, cast gear covers, small shafts, gears, pulleys and die castings. It is said to have effected a reduction in cleaning costs and parts to be painted issue from the machine dried, in condition to receive the finish.

Aluminum Reflectors

Street-light reflectors made of Alzak aluminum—a new material produced by an electrolytic brightening process and having high reflectivity and unusual weather-resisting properties—are now manufactured by the General Electric Company, Schenectady, N. Y. Three types are available—a 20-inch dome radial-wave reflector, a 20-inch flat radial-wave reflector, and a 20-inch dome radial-wave shading reflector, the last being designed to prevent unwelcome glare on adjacent residences and to give greater intensity on the street.

Costing but slightly more than porcelain finish for comparable reflectors, the new material offers a number of advantages. It has a reflection factor of more than 80 per cent, is rust-proof, and is extremely hard and durable. Tests made on the New England coast, where the reflectors were subject to actual spray from the ocean, have shown that

Latest Products

Each month the new products or services announced by companies in the metal and finishing equipment, supply and allied lines will be given brief mention here. More extended notices may appear later on any or all of these. In the meantime, complete data can be obtained from the companies mentioned.

Electric Weld Stress Reliever for Pipes Ranging from 6" to 24". Detroit Electric Furnace Company, Detroit, Mich.

New Motor Starter. An automatic motor starter which prevents accidental starting. Lincoln Electric Company, Cleveland, Ohio.

Unit Heaters for Commercial Installations. Fedders Manufacturing Company, Inc., Buffalo, N. Y.

Hot Material Belt. A conveyor belt called "Golden Ply" hot material belt. B. F. Goodrich Company, Akron, Ohio.

Small Littrow Quartz Spectrograph. Bausch and Lomb Optical Company, Rochester, N. Y.

Density Comparator. Bausch and Lomb Optical Company, Rochester, N. Y.

Liquid Belt Dressing. B. F. Goodrich Company, Akron, Ohio.

the new surface is impervious to salt atmospheres, that depreciation is very low, and that practically the original efficiency can be restored merely by washing the reflectors with soap and water.

The first installation, comprising 100 of these reflectors, has recently been made by the Orange and Rockland Electric Company at Monroe, N. Y.

Cleaning Aluminum and Tin

A test was recently run by the Philadelphia Quartz Company, 121 S. Third Street, Philadelphia, Pa., with various types of cleansing materials on aluminum and tin. These materials included their own product, Metso, a sodium silicate. Below is an abstract of the results of their experimental work:

"Sodium metasilicate as a convenient dry salt available for cleansing operations, was early shown to have certain distinctive merits. Although its solutions are highly alkaline, it shares with other soluble silicates what might be called the protective effect of the presence of silica. This is not to say that it is as mild as the less soluble forms containing more silica, but rather that, compared with other forms of alkali available for cleaning operations it exhibits a certain restraint peculiarly its own which gives it a definite place in scientifically devised cleaning programs. This can now be given a quantitative expression at least for some of the uses which are of concern for industrial cleaning.

"Five strips of aluminum were cut from the same sheet. One was a blank to which no treatment was applied. Other specimens represented the effect of soda ash, trisodium phosphate, Metso sodium metasilicate, and caustic soda. The one treated with Metso showed an excellent reflection of an object held in front of it. The others were so badly etched by the alkalies that they gave no reflection. In 1% solutions, acting for sixty minutes at 212° F. the weight loss statistics were as follows:

	pH	Weight Loss
Caustic soda NaOH ...	13.2	0.6500 g.
Metso, $Na_2SiO_3.5H_2O$..	12.2	0.0005 g.
TSP, $Na_3PO_4.12H_2O$...	11.8	0.1030 g.
Soda Ash, Na_2CO_3.....	11.5	0.1100 g.

"From this it will be seen that, under the conditions stated, the metasilicate is almost without effect on the metal although severe corrosion is caused by other alkalies, both more and less alkaline than the metasilicate. It is natural to ask whether the metasilicate is a good cleaner. This has been abundantly proved both in the laboratory and in the plant.

"The effect of alkaline cleaners on tin is also a matter of importance. The comparison of soda ash, trisodium phosphate, Metso sodium metasilicate, and sodium sesquicarbonate at concentrations of .24% to which the metal was exposed for sixty minutes at 180° F. gave the following results:

Sodium sesquicarbonate, $Na_2CO_3NAHCO_32H_2O$.

	pH	Weight Loss
$Na_2CO_3NAHCO_32H_2O$.	10.0	0.0084 g.
Metso, $Na_2SiO_3.5H_2O$..	11.6	0.0004 g.
TSP, $Na_3PO_4.12H_2O$...	11.5	0.0200 g.
Soda Ash, Na_2CO_3.....	11.1	0.0126 g.

"The loss of weight, while significant of the actual attack on the metal, is not necessarily an index of the appearance of the surface. Tin plate is subject to an etching which develops the appearance of a crystalline structure on the surface, and in the experiment above recorded the greatest effect on the surface appears to have been produced by the soda ash although the weight lost was only a little more than half of that induced by the trisodium phosphate. Even the sesquicarbonate which one thinks of as a very mild alkali leaves the surface in rather unsightly condition. The sample treated in the Metso solution (which had the highest pH) not only gave the smallest evidence of corrosion as indicated by the loss of weight, but its surface was highly reflective and indistinguishable from that of the blank."

Magnusol

Magnusol is used for a new method of metal cleaning, developed by the Magnus Chemical Company, Garwood, N. J., which is said to offer advantages on certain types of work. The method consists in immersing dirty work in a solvent of high penetrative properties and which contains effective emulsifying agent for this solvent in water The solvent penetrates the oily dirt upon the work and unites with it. It also wets solid-particle-dirt placing it by reason of the dissolved emulsifying agents in proper condition for immediate defloculation and suspension when put in contact with water.

This idea was first brought up and discussed by Dr. R. W. Mitchell, Magnus Technical Director at the convention of the American Electroplaters' Society in Washington, D. C., in 1925. Magnusol is recommended for one of the always difficult cleaning jobs—to quickly remove all straight mineral oil film which resists emulsification by the usual aqueous alkaline-soapy cleaning solvent.

Using Magnusol, the articles to be cleaned are dipped in the solvent, or it too large for this, the solvent is painted or sprayed upon them. The next step is a rinse, preferably a pressure rinse which may be of cold water. This serves to carry off in emulsion a large proportion of the dirt present on the surface.

Following the rinsing, the metal should go through the ordinary routine platers cleaner and rinsing operations which usually precede metal finishing. Magnusol it is stated, will not leave a chemically clean surface. Work cleaned by it will be noticeably cleaner but it will show water breaks.

In general Magnusol is used in an open still tank in the same way that any cleaning solution would be used. It is advantageous, where possible, to allow work to soak in it for a few minutes. This dip may be cold but penetration is more rapid if the solution is warmed to 140° F. It is desirable on difficult work such as work with irregular surfaces, to have the work agitated in the solution.

After the baskets or racks of work are removed from the solvent, it is desirable that they be held over a drain board or trough at one end of the tank for a minute or so, in order that as much as possible of the drag-out of the solvent be returned to the tank.

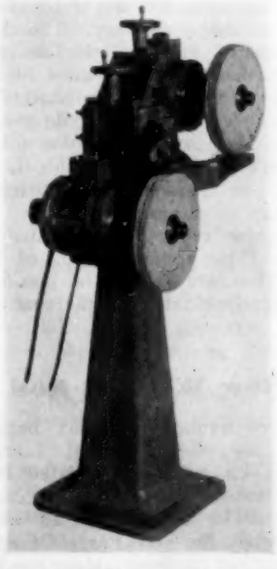
For large machinery, and particularly for cleaning automotive motor blocks, the solution may be painted thoroughly upon the surface to be cleaned and rinsed with a pressure hose after allowing it to stand for a short time.

New Key Lathe

The Turner Foundry and Machine Company, 917 W. Schiller Street, Philadelphia, Pa., has designed a new 12" double head key lathe, which it is claimed, is the most rigid tool ever designed for the accurate turning of brass and iron taper plug cocks. The machine is Timken equipped, with new friction countershafts. The floor space required is 7' 2" x 2'; shipping weight, 1500 pounds.

Machine for Cleaning and Polishing Strip Steel

A new production machine is being sold by the Standard Electrical Tool Company, 1938 W. 8th Street, Cincinnati, Ohio, which permits the cleaning and polishing of both sides of steel strip in one operation, in connection with electrical hardening and tempering furnaces.



Production Machine for Polishing Strip

The method is to have one machine for cleaning the scale, buffing wheels being used which have emery glued to the face and another machine for polishing the strip. Vertical adjustment is provided to compensate for the wheel wear and a guide shoe is located at each wheel. The machine is applicable to wire of all sizes.

New Name and Address for Udylite

The Udylite Process Company of Detroit, Mich., has changed its name to the Udylite Company and is located in new quarters at 1651 East Grand Boulevard, Detroit, Mich. The change of name was brought about by the fact that since 1932, the company has been actively engaged in the promotion and sale of a complete line of electroplating supplies and equipment, in addition to its cadmium plating process. The new name is broader and consequently more indicative of the scope of the company's operations.

The new building has three times as much floor space as the old and thus provides for ample room for future projects. It includes laboratories which, it is stated, are larger and more complete than ever.

New Quarters for Udylite

Trivalent Chromium Analysis

An analytical set has been made by the Kocour Company, 4724 S. Turner Avenue, Chicago, Ill., for analyzing solutions for trivalent chromium. The set consists of a comparator and a pipette with full directions for operations.

The chromic acid content must first be determined for this purpose, the use of the Kocour Analytical Set CA, or any chemical method is recommended. Hydrometer readings are used in many cases, but they are not recommended, being lacking in accuracy. The chromic acid content indicates the amount of solution that must be placed in a test tube, using the pipette furnished. Water is then added to the tube and the color matched with standard color tubes of the comparator. The result is read directly in percentages of trivalent chromium to chromic acid.

The color tubes are graduated from zero to 7 per cent in steps of 1 per cent. They are said to be non-fading, consequently eliminating the cost of upkeep.

New Welding Rod

A new welding rod has been developed by the Unimetal Company, Franklin, Pa., which, it is stated, can be used in two ways, to weld die castings and to solder aluminum. In welding die castings, the procedure is the same as with other castings. Heat the metal around the weld until small blisters appear on the surface and then puddle the Unimetal rod into the job, under the surface, until the weld is started; then proceed as in welding aluminum. The rod should be kept away from the flame as much as possible. In welding large castings, a slight pre-heating is necessary.

In using Unimetal as a hard aluminum solder, first clean the metal thoroughly with a wire brush or grind it; heat the metal to be soldered with a torch, then wipe or brush the Unimetal rod on the parts to be soldered. If it is a thick aluminum casting it will be better to vee out the place to be soldered and then build in.

Some of the jobs for which it is recommended by the manufacturer are:

White metal and aluminum patterns in foundries; aluminum auto bodies; building up and repairing worn out castings.

It is claimed also that the soldered or welded parts can be plated.

Oxyacetylene Outfit

To meet the need of steamfitters and plumbers for a reasonably priced outfit for the installation of Walseal Threadless Bronze Fittings by the Aircobraze process, Air Reduction Sales Company, New York, have developed the Aircobraze Oxyacetylene Outfit.

Aircobraze Oxy-Acetylene Outfit

With this outfit hooked up to the gas cylinders, it is only necessary to slip the brass pipe into the Walseal fitting until it butts up against the shoulder and apply the Aircobraze process to the pipe and fitting until the white ring of Sil-Fos appears around the pipe—visible evidence that the joint has been made. A profusely illustrated four page bulletin, completely describing this outfit and illustrating the Aircobraze process, will be forwarded upon request.

Aircobraze Oxyacetylene Outfits will be distributed by the Walworth Company to the plumbing and heating trade through their district sales offices. This same outfit is also entirely suitable for pipe welding.

Heat and Corrosion Resistant Material

A new material with unusual qualities claimed for it has been developed by Kux-Lohner Machine Company, 2145 Lexington Street, Chicago, Ill., called "Kux Hi-Heat" (a molded material). Its advantages are given as follows:

1. Non-oxidizing—no grain growth to 1800° F.

2. Highly resistant to corrosion, even at high temperatures and can be used in contact with food products and weak solutions of most acids and alkalies.

3. Fine grain structure—dense, hard and tough. Increases in ductility and strength up to red heat.

4. Can be machined to accurate dimensions.

5. Can be highly and permanently polished.

Parts Made of Kux Hi-Heat

6. High coefficient of expansion; always returns to original size upon cooling.
7. Tensile strength 45,000 to 50,000 lbs. per square inch.
8. Hardness—250-270 Brinell.

Kux Hi-Heat-X Material is especially recommended for annealing boxes; melting pots for non-ferrous metals; oven and furnace doors; fire boxes; stoker parts and a legion more of apparent applications.

Kux Hi-Heat-Y Material has, it is stated, the same qualities as above and in addition, can be machined to great accuracy and will take a high permanent polish; for creamery and dairy machinery, food products, etc.; (especially suitable for die casting and Bakelite die blocks.)

New Aluminum Alloy

A new light aluminum alloy known as Ceralium 'C' has recently been placed on the market by J. Stone, & Co., Ltd., Deptford, London, S. E. England. The percentage composition, of the new alloy which is covered by British Patent Specification 403,700 is as follows:

Copper	2.5
Nickel	1.5
Magnesium	0.8
Silicon	1.2
Iron	1.2
Cerium	0.15
Aluminum	Remainder

The most novel feature claimed is the presence of cerium. The firm claims that, in addition to its refining action on the macro-structure, cerium allows the beneficial mechanical effects of a fairly high iron content to be obtained by suppressing the embrittling iron-aluminum constituent which is otherwise likely to be formed. The small amount of cerium also it is stated, confers on the alloy important advantages in the foundry.

The heat-treatment applicable to the new alloy is quite simple. The castings are maintained at the solution temperature of 515 to 535°C. for 4 to 6 hours and then quenched in water; aging is achieved by heating to 175°C. for 16 hours followed by quenching in water. The risk of distortion at the solution temperature is no greater than that involved in heat-treating Y alloy at 520°C., and careful measurements on castings having unfavorable features, such as overhung arms and bosses, have, it is stated, failed to detect any distortion resulting from heat-treatment.

In the heat-treated condition Ceralumin 'C' presents a combination of high tensile strength at ordinary and elevated temperatures, high elastic limit, high Brinell hardness and high fatigue strength. These features are given in detail in the accompanying table, but special attention is drawn to the very high fatigue strength (Wohler, 20,000,000 reversals) of ± 8.25 tons per sq. in.

Ceralumin 'C' is said to be suitable for high-duty service in the form of die-castings, chill castings and sand castings.

If the artificial aging treatment is replaced by aging at room temperature for 5 days, a modified form of the alloy is produced which is known as Ceralumin 'D'. A somewhat lower tensile strength is obtained, but the ductility is considerably increased. This modification is intended for purposes where extra toughness is required in castings, such as for shrinking-on cylinder heads where heavy stresses may be set up and a little "give" in the castings is necessary. This alloy is also recommended for small reciprocating parts in various types of machinery. Specific gravity of the Ceralumin alloys is 2.79.

High Pressure Castings

The successful employment of hydraulic pressure in die casting, as it is now being done by Pressure Castings, Inc., in Cleveland, is the work of N. N. Lester, chief engineer of the company.

In the development of the hydraulic casting process, Mr. Lester states that all of the previous weaknesses in die castings such as varying structure, pinholes, blow-holes, porosity, etc., have been overcome. The pressure being hydraulically applied not only avoids the injection of air into the metal but permits such tremendous pressures as 3,000 to 17,000 pounds per square inch.

Additional advantages claimed for the solid pressure method include the better handling of the molten metal throughout the process. The metal is kept plastic in a closed, non-oxidizing furnace. Its only contact is with a non-metallic holding pot. It is not subject to the contamination that results in the air casting process, where the metal at high temperature comes in direct continuous contact with the iron pot and gooseneck; also greater tensile strength, especially desirable in aluminum, brass or bronze castings having thin walls.

In high pressure casting, a charge of the molten metal is either automatically or manually picked up and placed into a cylinder in close proximity to the die. Here it comes into momentary contact with the cold ground surfaces of the cylinder and plunger head, this action chilling a thin protective shell on the metal. Almost simultaneously the plunger is actuated, which crushes this thin solidified shell and propels the metal under great pressure into the cavity of the die. As the plunger is moved by a hydraulic cylinder, a definite space of time is required for the actual injection of the metal. While this period of time is only a fraction of a second, it is long enough to allow for the complete scavaging of the air from the mold, thereby insuring the perfect solidity, homogenity and density of the resulting casting.

The present plant of Pressure Castings, Inc., is located in the former Stearns-Knight automobile factory in Cleveland. Plans are now under way for increased production facilities.

Catalogs

Straight Roller Radial and Roller Thrust Bearings. Bantam Ball Bearing Company, South Bend, Ind. (188)

Horizontal Duplex Piston Pumps. For handling liquids at pressures up to 125 pounds per square inch. Worthington Pump and Machinery Corporation, Harrison, N. J. (189)

Centrifugal Pumps. Single stage Volute Type L No. 8. Worthington Pump and Machinery Corporation, Harrison, N. J. (190)

Vulc-On Rubber Tired Wheels for Industrial Trucks. B. F. Goodrich Company, Akron, Ohio. (191)

Electric Instruments. Catalog GEA.-602D, 1934. General Electric Company, Schenectady, N. Y. (192)

Loxal Metal Coating. Rust-proofing bond between metal and its finishing coat. Curtin-Howe Corporation, Chrysler Building, New York. Distributors, Hanson Van Winkle-Munning Company, Matawan, N. J. (193)

Bakelite Synthetic Resins for Paints and Varnishes. Bakelite Corporation, 247 Park Avenue, New York. (194)

"Golden Drops." Chemical control service offered by J. C. Miller Company, 528 Lake Michigan Drive, Grand Rapids, Mich. (195)

Save time. Use the coupon below to get any of the above catalogs or bulletins, or for data on any subject not mentioned this month. METAL INDUSTRY will see that you get them promptly.

METAL INDUSTRY
116 John Street, New York.

(Insert below the number in parentheses at end of each item desired.)

I wish to receive the following bulletins mentioned in September .....

.....

I want information on the following equipment or materials also: .....

.....

The Application of Monel Metal and Nickel to Industrial Processing Equipment. Data revised to July, 1934. International Nickel Company, 67 Wall Street, New York. (196)

Grinding Wheel Markings and Wheel Selection. A condensed summary of the Norton method of marking grinding wheels and a complete table of recommendations for various grinding operations. Norton Company, Worcester, Mass. (197)

The Shielded Arc. Why the shielded arc produces better welds. Lincoln Electric Company, Cleveland, Ohio. (198)

Monel Metal, Nickel and Nickel Clad Steel. Data on their physical and mechanical properties. International Nickel Company, New York. (199)

Manual for Heat Treating Steels with Cyanides and Salts for the Metallurgist and Steel Treater. R & H Chemicals Department, E. I. DuPont de Nemours and Company, Inc., Wilmington, Dela. (200)

Horizontal Duplex Piston Pumps for Handling Liquids at Pressures up to 250 pounds per Square Inch. Worthington Pump & Machinery Corporation, Harrison, N. J. (201)

Steam Booster Compressors. Worthington Pump & Machinery Corporation, Harrison, N. J. (202)

Air Conditioning Data. Bulletin 27. Kansas City Testing Laboratory, Kansas City, Mo. (203)

Dow Chemicals. Includes a wide range of information on the facts needed to determine the application of the products to given uses. Dow Chemical Company, Midland, Mich. (204)

Reference and Estimating Card for Ornamental and Architectural Metalwork. Newman Brothers, Inc., Cincinnati, O. (205)

Suggested Plans for Photo-Micrographic Dark Rooms, Bausch & Lomb Optical Company, Rochester, N. Y. (206)

Associations and Societies

American Foundrymen's Association

HEADQUARTERS, 222 W. ADAMS ST., CHICAGO, ILL.

Developments and progress in the castings industry throughout the whole world will be the theme of the Fifth International Congress to be held in conjunction with the 38th Annual Convention and Exposition of the American Foundrymen's Association in Philadelphia, October 22 to 26.

Modern developments will be presented from three angles: advances in technical knowledge, progress in operating practice, and latest design and improvements in foundry equipment.

The program of papers, discussion, informal meetings, and exhibition of equipment will provide valuable information on many phases of foundry work.

A feature of this Congress is the unusual number of papers from foreign foundry groups. Australia, Belgium, Czechoslovakia, England, France, Germany, and Italy are contributing papers dealing with modern foundry practice in those countries.

Materials Handling

One of the sessions which will be of interest to all foundrymen is the Materials Handling Session. Executives will find special attention given to the problems of foundry maintenance and the selection of foundry equipment as an investment.

Refractories

Refractories will be the subject of a second general interest session. Several papers of unusual practical value will be presented; among them, a discussion of the relation between slags and refractory linings, a resume of modern crucible melting equipment, and a study of the properties of clays obtained from different sources.

Sand

The shop operation course on sand control, which has been one of the most popular and instructive features of former conventions will be repeated this year. There will also be a session on sand control and research, where questions of analysis, supplies, and methods of control will be studied.

Apprentice Training

Apprentice Training will be taken up at one session and more detailed announcement will be made later.

Nonferrous Castings Sessions

A symposium on deoxidation and degasification of nonferrous castings alloys, a general session and a round table luncheon are on the program for nonferrous founders. At the symposium, there will be a discussion of general principles; then the meeting will take up bronze foundry alloys, yellow brass casting alloys, and aluminum and its alloys.

The general session on nonferrous castings will be rich in practical information. Porosity in leaded bronze bushings, and cupola melting of red brass, are two of the subjects to be considered.

Tentative Program

MONDAY, OCTOBER 22

Morning: Registration and Committee Meetings
Afternoon: Formal Opening of Exposition
Shop Operation Courses
Evening: Annual Alumni Dinner

TUESDAY, OCTOBER 23

Morning: Formal Open Meeting
Afternoon: General Steel Session
General Nonferrous Session
Apprentice Training Session
Shop Operation Courses
Evening: Reception to Overseas Guests

WEDNESDAY, OCTOBER 24

Morning: Steel Session—Symposium on Porosity
Refractories Session
Cast Iron Session
Noon: Nonferrous Round Table Luncheon
Steel Round Table Luncheon
Afternoon: Refractories Session
Shop Operation Courses

THURSDAY, OCTOBER 25

Morning: Cast Iron Session
Malleable Cast Iron Session
Materials Handling & Foundry Equipment Session
Noon: Cast Iron Round Table Luncheon
Malleable Cast Iron Round Table Luncheon
Afternoon: Special Lecture and Medal Awards
Annual Business Meeting
Shop Operation Courses
Evening: Annual Banquet

FRIDAY, OCTOBER 26

Morning: Cast Iron Session—joint A.F.A.-A.S.T.M.
Sand Control and Research Session
Afternoon: Special Plant Visit

Exhibits open daily 9:00 A. M. to 5:30 P. M. except Wednesday, when the closing hour will be 10:00 P. M.

Plan Tour for Overseas Visitors

Overseas foundrymen visiting the forthcoming Fifth International Foundry Congress will have an unusual opportunity, within a short space of time, to inspect and study a cross section of American foundry practice. From the time they leave the Eastern coast following their arrival on Oct. 10, until they embark for their various homelands on Oct. 27, these distinguished Europeans will have available for their interested inspection examples of practically all phases of castings manufacture.

The pre-convention tour of the overseas party will cover the period from Oct. 10 to 22, extending from the debarkation in New York until the arrival in Philadelphia. It will embrace Buffalo, Chicago, Detroit, Cleveland, Pittsburgh, and Washington, enroute, with preferential foundry inspection trips to Milwaukee, Saginaw, and adjacent cities where a number of the large shops of special interest have been made available for visitation.

To provide a variety of types and classes of work, some of the leading manufacturing establishments have offered to receive parties of visitors. These include plants making various classes of jobbing work and specialties in gray iron, steel, malleable, brass and aluminum castings, ranging from heavy machinery and rolling mill equipment to stoves, radiators and automotive parts. A tentative list of plants available for inspection includes the following:

Nonferrous founders will take interest in the paper on "Porosity of Leaded Bronze Bushings", by A. W. Lorenz, of Bucyrus-Erie Co., Milwaukee. Mr. Lorenz tells of his experience with this trouble, and his approach to the problem. After a careful study of metal currents in the mold, he was able to cut losses from this cause by changing the gating. His discoveries along this line will be of value to all foundries making this type of casting.

These are only a few of the worthwhile papers scheduled for the International Congress, which will be held at the Philadelphia Museum and Convention Hall.

Non-Ferrous Foundry Association

HEADQUARTERS, 47 FULTON ST., NEW YORK

Arrangements have been made for the first Annual Meeting of the Non-Ferrous Foundry Industry to be held under the auspices of the Non-Ferrous Foundry Association for Industrial Recovery.

Time—September 19-20-21.

Place—Bismarck Hotel, Chicago, Illinois.

Program Committee:

Frank L. Hayes—Chairman, Chicago Hardware Foundry Company, 1516 Merchandise Mart, Chicago, Illinois.

F. N. Flynn, Arthur Harris Company, Chicago, Illinois.

George B. Miller, The Loeffleholz Company, Milwaukee, Wisconsin.

J. L. Wick, Jr., The Falcon Bronze Company, Youngstown, Ohio.

S. K. Becker, U. S. Aluminum Company, Fairfield, Connecticut.

It is contemplated that the program will include open sessions on the following subjects:

1. A Uniform Cost Estimating and Accounting System.
2. Classification of Castings as to Weight and as to Intricacy.
3. Uniform Standard Trade Customs and Terms of Payment.
4. Proposed Amendments to the Code and a Proposed Supplemental Code covering "Specialty Castings."

Included in the program will also be a general meeting for the Miscellaneous Sand Casting Division and meetings of such other Divisions as may desire to be placed on the programs.

At the general meeting of the Association Election of Officers for the coming year will take place.

After the meetings and election of officers a dinner will be held at which we hope to have a speaker of prominence as well as remarks from the newly elected officers.

The following day after the dinner there will probably be meetings of the Board of Directors of the Association and of the Code Authority.

Meeting of Metropolitan Chapter

A meeting of the Metropolitan Chapter of the Non-Ferrous Foundry Association was held at 8:00 P. M. on Wednesday August 1, at the Building Trades Employers Association, 2 Park Avenue.

The meeting was called to order at at 8:30 P.M. by the acting chairman, Mr. Tour, who first presented and discussed the uniform cost estimating system which has been developed for the industry. After discussion from the floor it was decided to appoint a cost committee to handle this problem.

The following men were appointed: Messrs. Landolt, C. Luppy, Friedman, Tamaroff, Fortamaroff, Fiamma, Halloran, Safer.

The chairman then discussed a proposed system of classification of castings on the bases of weight and intricacy. It was then decided that the cost committee should also act as the committee to study this problem.

Discussion then centered about the question of Uniform Terms of Payment. The chairman then called on each man present to state his preference in this matter. A plurality desired the terms of payment to be 1% 10 days net 30 days.

Motion was then made By Mr. Halloran, seconded by Mr. Landolt that the Metropolitan Chapter adopt as uniform terms of payment, 1% 10 days net 30 days. Net 30 days to mean that bills from the 1st to the 15th payable the 15th proximo, bills 16th to last of month payable the 30th proximo. The motion was carried unanimously.

Election of Temporary Officers

Chairman—B. Tamaroff.
Vice Chairman—F. Landolt.
Secretary—B. M. Friedman.
Executive Committee—Messrs. Halloran, Martin and Fiamma.

The Executive Committee will be composed of these three together with the temporary chairman, vice-chairman and secretary.

Electrochemical Society

HEADQUARTERS, COLUMBIA UNIVERSITY, NEW YORK

The New York meeting will be held at the Hotel Pennsylvania, New York, September 27-29, 1934. Plant visits have been arranged for the afternoons of September 27 and 28, including the Bell Telephone Laboratories, Westinghouse Company, Hanovia Chemical Company and others. A session on Electrodeposition will be held on Saturday morning, September 29.

American Zinc Institute

HEADQUARTERS, 60 EAST 42nd ST., NEW YORK

Educational exhibits of galvanized roofing will again be presented by the American Zinc Institute at various State Fairs in leading agricultural states. In these exhibits "Seal of Quality" heavy-coated galvanized sheets will be featured; the economy of heavy zinc coatings will be demonstrated, as well as the opportunity for increased business which "Seal of Quality" sheets afford to distributors and dealers in building materials.

September 10-15: Kansas Free Fair, Topeka, Kansas. Space No. 1, Merchants & Manufacturers Building.

October 20-27: American Royal Live Stock Show, Kansas City, Missouri—Space to be announced later.

American Welding Society

HEADQUARTERS, 25 W. 39 ST., NEW YORK

The Fourteenth Annual Meeting will be held at the Hotel New Yorker, New York City, October 1-5, 1934.

Papers dealing especially with non-ferrous metals will be the following:

"Silver Solders and Fluxes" by R. H. Leach, Handy & Harman, Bridgeport, Conn.

"Metal Spraying" by E. V. David, Air Reduction Sales Company, New York.

New York Branch, A. E. S.

A regular meeting was held on July 27, at which time Emil Bittener read an interesting paper on Finishes on Brass and Bronze for Statues and Ornamental Work. It was ably delivered by Mr. Bittener, who is considered an authority on this class of work, and was productive of much discussion by the members.

Our August 10 meeting proved very interesting with lively discussions on a variety of subjects and plating problems.

One of the members brought up the subject of patented nickel solutions and their worth in commercial plating.

Another educational subject was the plating of an aluminum-tin alloy from an alkaline solution, using aluminum anodes. A lengthy discussion was held on the recent convention proceedings, after which meeting was adjourned.

Mr. Martin B. Apy, one of our prominent members is still dangerously ill and confined to bed. The members wish him a speedy recovery.

Arthur Wallace
Rec. Sec.

Newark Branch, A. E. S.

The Annual Clambake of the Newark Branch, A. E. S., will be held on Saturday, September 29, at Vogel's Grove, Springfield, N. J. Tickets are $3. All members of the A. E. S., and their friends are invited. For information write to the Secretary, George Reuter, P. O. Box 201, Newark, N. J.

Personals

Herbert C. Jennison has been appointed technical manager of the American Brass Company, Waterbury, Conn. He succeeds the late William H. Bassett who died suddenly at his Cheshire residence on July 21st.

Mr. Jennison has been in the technical department for 35 years and was assistant to Mr. Bassett. He spent much of his time in the Ansonia Division, but in the future will divide his time among the firm's plants in Waterbury, Torrington, Ansonia, Buffalo, Kenosha, Detroit and Toronto. He is expected to reside in Bridgeport.

Mr. Jennison is a member of the American Society for Testing Materials, the American Institute of mining and Metallurgical Engineers, the British Institute of Metals, the American Institute of Electrical Engineers and the Electro-Chemical Society.

M. A. Whitehead has been appointed production manager and sales engineer for the Flamm Lead Company, Long Island City, N. Y.

Mr. Whitehead has been active in the metal industry since 1920. He was one of the founders of Victory White Metal Company of Cleveland, Ohio. He sold his interest in 1921 and joined the sales department of the Hoyt Metal Company, of New York and St. Louis. In 1926 he was made production manager of the Hoyt Metal Company and in 1930 when the Hoyt company was taken into the National Lead Company, he supervised the installation of the three mills for rolling hard alloys at the Perth Amboy, New Jersey plant and became plant manager of the sheet specialties department, doing both selling and manufacturing.

In 1933 Mr. Whitehead went to the general offices and helped to introduce to the tin plating and collapsible tube trade, William Harvey & Company pig tin. After this he worked on the introduction of tellurium containing sheet lead and pipe for chemical installations.

Jacob Hay who is well known to members of the American Electro-Platers Society, is now with the Frederick Gumm Chemical Company, in charge of their Chicago and Detroit Territory.

Ernest A. Earle has been appointed sales representative in Pennsylvania, New York and the New England states, for the industrial division of **Aluminum Industries, Inc.**, of Cincinnati, manufacturer of Permite Products. Mr. Earle's headquarters will be at 344 Stillwell Ave., Kenmore, Buffalo, N. Y. His territory will include all the section east of Pittsburgh and north of Baltimore, taking in all the metropolitan cities in that area.

Lewis L. Bredin, formerly manager of the screen division of the **Chamberlin Metal Weather Strip Company, Inc.,** Detroit, Mich., has been elected president of the company by the Board of Directors. Mr. Bredin, prominent in Detroit activities, has been associated with the company since 1919.

Leslie McArthur has resigned as vice-president and general manager of the Bassick Company, Bridgeport, Conn. **W. L. Rose,** Chicago, Ill., has been elected to succeed Mr. McArthur.

Dr. R. W. Mitchell, the Technical Director of Magnus Chemical Company, Garwood, N. J. sailed on August 18th on the S.S. "Ile de France" for an extended European trip. He will spend three weeks with Mr. Marcel Boss the Magnus European agent and distributor at Paris, France. This branch established last year, has made excellent headway. Dr. Mitchell will later visit the leading establishments in France, Germany and Italy, ending his trip with a vacation stay in Spain.

Dr. J. S. Long, author of many books and articles and a recognized authority on drying oils, has resigned his position as Professor of Chemistry at Lehigh University to become Chemical Director of Devoe and Raynolds Company and Subsidiaries, according to an announcement made by E. S. Phillips, president of the company.

Industrial and Financial News

News of the Codes in The Metal Industries

COPPER

The Code Authority for the copper industry has been approved, consisting of the following members:

E. T. Stannard, Kennecott Copper Corporation, 120 Broadway, N. Y. City. Alternates: **C. T. Ulrich; R. C. Klugescheid.**

C. F. Kelley, Anaconda Copper Mining Company, 25 Broadway, N. Y. City. Alternates: **James R. Hobbins; Robert E. Dwyer; Edward Mosehauer; E. O. Sowerwino.**

L. S. Cates, Phelps-Dodge Corporation, 40 Wall Street, N. Y. City. Alternates: **J. F. McClelland; C. E. Dodge.**

A. E. Petermann, Calumet & Hecla Consolidated Copper Company, 25 Broadway, N. Y. City. Alernate: **Philip F. Blandin.**

George A. Elis, United Verde Copper Company, 120 Broadway, N. Y. City. Alternates: **E. H. Westlake; Thomas Bordon.**

F. H. Brownell, American Smelting & Refining Company, 120 Broadway, N. Y. City. Alternates: **Hamilton M. Brush; John C. Emison; K. C. Brownell; Roger W. Straus; Charles Earl.**

B. N. Zimmer, American Metal Company, 61 Broadway, N. Y. City. Alternates: **Ludwig Vogelstein; Otto Sussman; Harold Hochschild; Heath Steele.**

Pope Yeatman, Yeatman & Berry, 165 Broadway, N. Y. City.

Clinton H. Crane, St. Joseph Lead Company, 250 Park Ave., N. Y. City.

William H. Anderson, John A. Roebling Sons Company, 6 Church Street, N. Y. City. Alternate: **E. N. Hammond.**

W. M. Goss, Scovill Manufacturing Company, 280 Broadway, N. Y. City. Alternate: **Ralph E. Day.**

ALUMINUM

Stuart F. Heinritz of Yonkers, N. Y., has been appointed Administration Member of the Aluminum Industry Code Authority. He is also an administration member of code authorities of a number of other industries.

ANTI-FRICTION BEARINGS

The N.R.A. has approved an amendment effective August 10th to the Code of the **Anti-Friction Bearing Industry** providing for definite terms of sales.

METAL ETCHING INDUSTRY

David L. Morris has been appointed Administration Member of the Code Authority of the Metal Etching Industry. Mr. Morris is a member of the law firm of **Wormser, Morris and Kemp** of New York.

NON-FERROUS FOUNDRY INDUSTRY

The Code Authority By-Laws have been approved by the Administration; also the procedure for handling complaints other than labor; also an application for the termination of exemption granted some members of the industry whose principal line of business is covered by another code, thus making every member of the industry bear his share of the expenses.

A budget and basis of assessment have been prepared. The basis of assessment is 0.2% of the sales, payable monthly

on the previous month's sales records.

Definite arrangements have been made for the annual meeting which will be held in Chicago, Ill., at the Bismarck Hotel, September 19th and 20th.

Metal Developments

The new **Super-Liner 534**, which was launched by Queen Mary of England at Clydebank, September 27th, is the largest liner afloat. Among the materials which she has consumed are 4,000 miles of copper wire for electrical purposes.

Germany has rigidly curbed the use of foreign metals because of her policy of cutting down imports in order to improve her trade balance. A recent order prohibited the use of copper and tin in household fittings.

Siemens and Halske, Berlin, Germany, recently entered into an agreement with the **Heraeus Vacuumschmelze,** Hanau, under which the distribution of beryllium and its alloys will be handled by the latter company. The Heraeus company will also manufacture and treat beryllium alloys. The **Beryllium Corporation of America** is included in this combination through the exchange of technical and scientific information.

The new stainless steel high speed train, the **Zephyr**, of the Burlington lines has the walls and roofs of the cars insulated throughout with **Alfol,** which is made up of sheets of crinkled aluminum foil.

Beryllium copper alloys are continuing to find new fields. Among the more recent are handles for surgical instruments, strips for springs in office machinery and worm gears.

Copper is a beneficial addition agent to steel according to a discussion by **Dr. H. Foster Bain,** in an address before the Cleveland chapter of the American Society for Metals. The Copper and Brass Research Association, of which Dr. Bain is managing director, has sponsored a research at the Battelle Memorial Institute, on copper and its uses.

Brass Tags for Banks

The Federal Deposit Insurance Corporation has sent to 14,000 banks throughout the country 80,000 brass tags which say in effect that "this bank is insured by the government." Their use is required by law. Little banks will display only one tag, but the big ones may spangle their lobbies with them.

Aluminum Company Strike

The employees of the Aluminum Company of America, went on strike on August 11th, which resulted in the closing down of the plants in New Kensington, Arnold and Logan's Ferry, Pa., Alcoa, Tenn.; E. St. Louis, Ill., and Massena, N. Y. The company's plants at Fairfield, Conn., Badin, N. C., and Edgewater, N. J., continued to operate.

The demands of the strikers included complete recognition of the Union (a part of the A. F. of L.) and a written agreement guaranteeing that there would be no immediate wage cuts. At the time of writing, negotiations are still going on for a settlement.

Pricing Conferences by Trade Groups

Members of various industries located in and around the metropolitan area will be invited by the Pricing Committee of the New York Board of Trade 41 Park Row, New York, to attend a series of conferences at which methods for properly pricing the goods or services supplied by the industries will be discussed.

The New York Board of Trade is doing everything in its power to bring about profitable prosperity and regards proper prices as an essential factor in this program. It formed the Pricing Committee to interest business men and the public in the proper pricing of goods and services. In pursuance of this plan, the Pricing Committee is holding a series of conferences, each to be attended by members of a given industry or related groups of industries. At these conferences, methods of determining the right prices of the industry's goods or services will be discussed.

Earnings of Companies

(Net profit unless followed by (L) which is loss.)	6 months 1934	6 months 1933
Aluminum Industries, Inc.	67,728	62,291
American Cyanimid Co.	1,066,146	523,267
Baltimore Tube Company	14,811	34,777(L)
Calorizing Company (year ending April 30)	32,413	35,541(L)
New Jersey Zinc Company	2,086,511	1,370,380
Anaconda Wire & Cable Company	611,614	449,589
Hoskins Manufacturing Company	174,863	25,256
Western Cartridge Co. (year ending Dec. 31)	1,806,892	642,816(L)
National Enameling & Stamping Co.	210,889	34,760(L)
Vulcan Detinning Co.	158,259	94,996
International Nickel Company	10,012,642	1,862,889
Parker Rust Proof Company	550,227	275,349
Club Aluminum Utensil Co. (year ending June 30)	111,352(L)	332,846(L)

Business Items Verified

Standard Air Conditioning, Inc., New York, has been organized as a subsidiary by American Radiator and Standard Sanitary Corporation 40 West 40th Street, to take over the Air Conditioning Division of Campbell Metal Window Corporation, Baltimore, Md., another unit of parent organization. Fowler Manning is president of the new company.

International Silver Company, Meriden, Conn., manufacturer of plated ware, etc., has let general contract for one-story addition to plant M, Wallingford, Conn. Cost about $29,000. The following departments are operated: tool room, casting shop, rolling mill, cutting-up shop, spinning, stamping, soldering, brazing, plating, polishing, grinding room, lacquering.

Sheet Metal Products Company, 320 S. Commercial Street, Peoria, Ill., has purchased the machinery and equipment from the Clark-Smith Hardware Company, who have liquidated their business. The Clark-Smith Hardware Company formerly operated this factory for a great many years manufacturing conductor pipe, eave trough and box gutters.

Harold E. Trent Company, Philadelphia, Pa., is opening an office at 143 Liberty Street, New York City, in charge of A. H. Gurtner.

V. E. Sprouse Company, Indianapolis, Ind., plans to erect a factory building at Columbus, Ind., and move its entire production plant to that city. The company manufactures metal products of various sorts. The company has had an experimental branch in Columbus for some time and will consolidate experimental and production branches. The following departments are operated: tool room, spinning, stamping, tinning, soldering, brazing, polishing and lacquering.

Anaconda American Brass Ltd., New Toronto, Ont., Can., awarded contract for a one story addition to brass factory. The following departments are operated: casting shop, rolling mill, tinning, polishing.

Revere Copper and Brass, Inc., 230 Park Avenue, New York, is building a casting shop at New Bedford, Mass.

Bawden Foundry, Freehold, N. J., has been sold to **E. W. Schumacher** and **Michael J. Kelly.** The new firm will manufacture castings of brass, aluminum, iron and semi-steel. The following departments will be operated: brass, bronze and aluminum foundry, casting shop, grinding room.

Detroit Electric Furnace Company, Detroit, Mich., announces that the **Case Hardening Service Company,** of Cleveland, Ohio, are sales representatives for the new rocking electric furnace recently developed in Detroit. This new furnace includes automatic timing mechanism which changes the angle of rock without operating attention. Its capacity of 35-50 pounds is such that it is being used for industrial, foundry and laboratory applications.

F. L. & J. C. Codman Company, manufacturers of buffing and polishing wheels announce their removal from South Boston to Rockland, Mass. They have increased their floor space 80% in this move.

H. L. Derby, president of **American Cyanamid and Chemical Corporation,** announces that, for the purpose of effecting closer co-ordination of their activities, the business of the following companies in the American Cyanamid group will be merged with, consolidated into and operated as Divisions of American Cyanamid and Chemical Corporation: American Cyanamid Sales Company, American Powder Company, Catalytic Process Corporation, Fumigation Service, Inc., Fumigators Supply Company, Inc., General Explosives Corporation, Gypsteel Construction Company, Inc., Maryland Chemical Company, Inc., Owl Fumigating Corporation, The Seldon Company, The Seldon Research and Engineering Corporation, Structural Gypsum Corporation.

News From Metal Industry Correspondents

New England States

Waterbury, Connecticut

Sept. 1, 1934.

In spite of the summer slump, which is running about the same as in normal times, a check on employment here by the Chamber of Commerce shows there has been a definite trend upward since April, 1933, and there are more people working now than a year ago, without taking into consideration those on federal relief projects.

In all concerns employing 65 persons or over the total employed now is 28,775 compared with 27,824 a year ago. In the eight largest factories the total is 15,443 compared with 14,601 a year ago. The 1934 peak was in May when the larger group had 30,234 persons at work and the eight largest had 16,637.

The creditors of the **Beardsley & Wolcott Company,** by applying to the Federal Court last month, stopped the state court from selling the concern for a price of about $106,000 to the Waterbury Buckle Company. They did this under the new Federal Bankruptcy Act. The concern has been in receivership for over a year and in recent months has been running at a loss. Receiver **James Sheldon** recommended that it be sold and **Judge Frederick M. Peasley** of the state court called for sealed bids. When these were opened he ordered the concern sold to the **Waterbury Buckle Company** at its bid of approximately $106,000. The attorneys for the creditors, in the meantime, had brought the action in the federal court and **Judge Carroll Hincks** of the latter issued an injunction stopping the sale. However, as formal word had not been received, **Judge Peasley** ordered the sale consummated and the deeds were passed. The next day the creditors obtained a further order from **Judge Hincks** which declared the sale void and ordered **Receiver Sheldon** to turn the property over to federal trustees appointed by him. They are **Lyle Brown** of Boston, **Francis T. Phillips** and **Thomas P. Kelly** of this city. They will function the same as a receiver. They are planning a reorganization and have been granted a loan of $65,000 from the RFC for this purpose. The creditors objected to the sale to the Buckle Co. on the ground that the amount received would be sufficient for only the expenses of the receivership, leaving nothing for the creditors.

The last report of the receiver showed a net loss of $14,037 for the year ending June 30 and a loss of $2,894 for July. Total assets are given as $478,376 including real estate at $31,443, buildings at $210,000, tools and equipment, $49,766 and patents at $1. Inventories are set at $159,823.

Scientists from all over the country, members and delegates from the American Institute of Mining and Metallurgical Engineers, the Institute of Chemical Engineers, American Association for the Advancement of Science, Society of Automotive Engineers, the American Society for Testing Materials and American Chemical Society, attended the funeral of **William H. Bassett,** metallurgist and technical manager of the American Brass Co., on July 24. Representatives from all the plants of the American Brass Co. throughout the country also attended.

Herbert C. Jennison, for 35 years a member of the technical department of the **American Brass Company,** has been appointed as Mr. Bassett's successor. He will spend most of his time in this city but as technical manager will visit the plants in Ansonia, Torrington, Buffalo, Kenosha, Detroit and Toronto. He has made many important discoveries and improvements in metal compositions. He is a member of the American Society of Testing Materials, the American Institute of Mining and Metallurgical Engineers, the British Institute of Metals, the American Institute of Electrical Engineers and the Electro-Chemical Society.

Frederick S. Chase, president of the **Chase Companies, Inc.,** is among those who have sent telegrams to the Federal Housing Administration indorsing the program and praising the appointment of **Albert L. Deane** as Assistant Administrator. He wrote:

"Your efforts, supplemented by his, (Mr. Deane) should be most effective in arousing nationwide interest in this work which can materially stimulate and revive durable goods industries and so relieve the excessive amount of unemployment in these industries."

—W. R. B.

Connecticut Notes

Sept. 1, 1934.

HARTFORD—Veeder-Root, Inc. had a net profit of $158,052 or $2.10 a share, from operations in the first 24 weeks of the year, compared with $12,643 for the same period last year. The net worth of the concern increased $127,282, after paying dividends of $52,500. A quarterly dividend of 40 cents a share was declared last month, payable Sept. 1 to stock of record Aug. 15.

The **Royal Typewriter Company** reports net profits of $476,156 for the first six months of the year compared with a net loss of $137,131 for the corresponding period last year.

Billings & Spencer Company reelected all its directors and officials at the annual meeting last month.

BRIDGEPORT — Bridgeport Brass Company's net earnings for the first six months of this year, after taxes, interest and depreciation, amounted to $313,429 compared with $83,110 for the same period last year.

Remington Arms Company plant here was closed for a week last month and all the 3,000 employes received a vacation with pay in keeping with the policy in the DuPont plants.

Several Bridgeport manufacturers made special shipments to South America in the S-42 of the Pan American airways on its maiden voyage.

TERRYVILLE—Officers and directors of the **Eagle Lock Company** were reelected last month without change. The financial statement showed a drop in the surplus from $854,386 to $562,900 after payment of dividends of $160,000. In addition to reserves for taxes and employes benefits a special security depreciation reserve of $283,975 is set up. The total assets of $3,358,490 are known to be valued too low, the real estate being set at only $50,000 and the tools and machinery at $50,000. The town's tax valuation is over $1,000,000. The property owned at 26 Warren St., New York is set at only $70,000.

WINSTED—The RFC has approved a direct loan of $125,000 to the **William L. Gilbert Clock Company,** recently reorganized. This is the culmination of two years of effort on the part of the management. The concern now employs nearly 500 persons. It is expected that the court will shortly approve the reorganization and end the receivership.

in full. **Ralph E. Thompson** is president of the company.

BRISTOL—The **E. Ingraham Company** was closed for two weeks last month for repairs and inventory.

MERIDEN—The **International Silver Co.** reports net loss of $40,302, after depreciation, for the second quarter of the year, compared with a loss of $50,331 for the same period last year. For the first six months of this year the company shows a net profit of $16,493, compared with a loss of $412,650 for the same period last year. The third and the fourth quarters are the company's best earning periods.

STAMFORD—Yale & Towns Mfg. Company reports net profit for the second quarter of $41,011, compared with a loss of $82,324 for the same period last year. Net profit for the first half of this year was $62,265 compared with net loss of $189,417 for the same period in 1933.

MIDDLETOWN—President **G. M. Williams** of the **Russell Manufacturing Company** announces the appointment of **C. E. Harwood**, who has been with the company since 1915, as salesmanager of the automotive equipment business. **William Brown**, formerly of the state highway department, has been appointed to the company's engineering department to anticipate the needs of car manufacturers for suitable brake linings for new cars and for replacement service.

NEW LONDON—The **Electric Boat Corporation** has been awarded contracts for three new 1,300 ton submarines for the navy, at a price of $7,161,000.

UNIONVILLE—The factory formerly occupied by the **Hartford Manufacturing Company** has been rented to the **Kane Manufacturing Company** of Plainville. The latter concern manufactures electrical novelties. It recently had a $15,000 fire in its Plainville plant.

—W. R. B.

Middle Atlantic States

Central New York

September 1, 1934.

General employment in Utica is showing an upward trend in spite of the usual summer slump. During the month ending in mid-July payrolls increased 8.2 per cent and employment increased 7.9 per cent. These figures for Utica and vicinity were given out by the **State Labor Department.**

The **Utica Chamber of Commerce** reports that building activities in this city have increased 210 per cent in the past six months while bank clearings are up 26 per cent.

At Ilion it was reported that preparations are now underway to do additional manufacturing which will create several hundred extra jobs in Plant 2 of the **Remington Rand, Inc.,** according to information received by **Albert M. Ross,** works manager. The new operations will include making parts for the **Powers Tabulating Machine** plant in Norwood, O. **Remington Rand** was reported to be making a survey of the Ilion residential district here to learn what homes are vacant and it is expected that 500 workers will be brought to Ilion from Norwood but no official confirmation of the report could be obtained.

Charles H. Harden, president, **Camden Wire Company,** Camden, N. Y., announced his plant will continue to operate despite the disasterous fire which did $50,000 damage. He hopes to have some of the departments operating in a few weeks. If it is possible to repair the old building, this will be done, if not the company will build new quarters.

The general business tone in this area is better than it has been for some time but the long dry spell causes concerns like **Savage Arms,** Utica, and other concerns whose products eventually go to farming territory to worry about Fall trade.

The **Rome Company Inc.,** of Rome, N. Y., has filed a petition in the Federal Court in Utica for re-organization. An order was issued by the Federal Court continuing the present management of the company. The order provides six months in which the plan of re-organization can be submitted. The schedule lists liabilities of $3,264,843 and nominal assets of the same amount. The company manufactures metal beds, springs and modernistic metal furniture.

The improvement in business with the **Revere Corporation** results from an increased volume, advancing commodity values and continued progress in operation. After deducting of bond, interest, depreciation and Federal income taxes the profits from operation amounted to $968,576.03 as compared with a deficit for $224,390.34 for the same period in 1933.

A gift of $5 each for each year of their employment with the **Union Fork & Hoe Company** was presented the workers at the factory in Frankfort, N. Y., in July. Sixteen of the employees have been with the factory since it took over the **Continental Tool Company** 27 years ago. **Edward Durrell,** treasurer of the company, who said the bonus will also go to the employees of the subsidiary plant in Columbus, O., stated that "In the face of difficulties the company had had a good year and was taking this method of showing its appreciation to the workers."

—E. K. B.

Newark, New Jersey

September 1, 1934.

The **Reynolds Metals Company** has purchased the plant of the General Electric Co., at Harrison and is making extensive alterations. The **Robertshaw Thermostadt Company** is a subsidiary of the **United States Foil Company,** which is owned by the **Reynolds Metals Company. Hagman Bros.,** Jersey City, will erect a chemical plant to cost $30,000. The **Interstate Industrial Equipment Company,** makers of ventilating systems and other equipment, has leased a large plant on Jeliff Avenue, Newark. **Merck & Company,** Rahway, is making repairs and alterations to the plant to cost $30,000. The concern also plans several additions.

Following Newark concerns have been incorporated: **Standard Cutlery Company,** manufacture cutlery, 2500 shares; **North Eastern Chemical Corporation,** chemicals, 500 shares; **Quality Neon Co., Inc.,** neon tubing, 2000 shares.—C. A. L.

Trenton, New Jersey

September 1, 1934.

Metal plants in Trenton report little change in business conditions during the past month The **John A. Roebling's Sons Company,** and the **American Steel & Wire Company,** are both fairly busy.

The **John H. Bawden** foundry, founded in 1856 at Freehold, and one of the oldest of its kind in the East, will resume work under new ownership within a short time. The plant has been closed for four months and was recently sold to **E. W. Schumacher,** former Millsboro, Ohio, foundry operator, and **Michael J. Kelly,** of Newark, former superintendent of a plant at Newark. New machinery is being installed in the plant for the manufacture of brass, steel, aluminum and custom made foundry articles.

Following concerns have been chartered here: **Eastern States Chemical Corporation,** Jersey City, 100 shares; **Calcyanide Products Corporation,** chemicals, Jersey City, $2,000; **V. A. Carlson, Inc.,** steel and brass, Montclair, 200 shares; **Espoma Company,** chemicals, Millville, 2500 shares; **Max Menein & Company,** manufacturing jewelry, Paterson, 100 shares; **New American Products Company,** chemicals, New Brunswick, $125,000.—C. A. L

Providence, R. I.

September 1, 1934.

Twenty-three corporations associated with the metal trades of Rhode Island are called upon this year to pay taxes amounting to $38,385.74 upon corporate excess of $100,000 or more each. The total excess of these concerns aggregates $8,596,571.84.

Kimbark Sheet Metal Supply Company, 270 Richmond street, Providence, is owned by **Everett E. Kimbark,** his statement filed at City Hall shows.

Rudolph E. Seaberg of 99 Myrtle avenue, Cranston, has filed a statement that he is owner of the **Auburn Brass Foundry,** 258 Wellington avenue, Cranston.

Modern Enameling Company, Inc., Providence, has been incorporated to conduct an enameling, plating, etc., business with an authorized capital of 100 shares of common stock without par

value. The incorporators are: **Walter Johnson** of Cranston, **John H. Peckham**, of North Scituate and **Helen E. Mowry** of Providence.

Notice has been filed at the office of the Secretary of State that the capital stock of the **Uncas Manufacturing Company,** manufacturers of jewelry, Providence, has been increased from $25,000 to $50,000.

Albert B. Peck, sales agent of the **American Screw Company,** Providence, has been appointed a member of the code authority for the machine screw manufacturing industry, under the provisions of the NRA.

Extensive alterations and improvements are being made by **Janico Newell,** at his brass foundry on North Main street, Pawtucket.

Approximately one hundred members and guests attended the annual outing August 8 of the **New England Foundrymen's Association** at the grounds of the Pomham Club overlooking Narragansett Bay. After luncheon, a sports program was carried out followed by a clambake at 4 o'clock. During the dinner a cabaret entertainment was given by a troop of professional performers. The prize for coming the longest distance was awarded to **R. C. Mills,** of Waterbury, Conn.

Edmund C. Mayo, president of the **Gorham Manufacturing Company,** has been named to membership on the Code Authority for the silver manufacturing industry under the NRA. He is also a member of the executive committee of the **Silverware Manufacturing Institute.**

The **J. W. Bishop Company** of Providence, has been awarded a contract for the erection of a one-story brick factory building for the **Revere Copper & Brass Company, Inc.,** on the easterly side of the company's present plant at New Bedford. The building will be 147 x 182 feet on the ground and will cost between $45,000 and $50,000. It is stated that when the building is completed foundry work which has hitherto been done in Taunton, where the company has maintained a plant, will be transferred to New Bedford.

Harry Goldenberg, Louis Strauss and **Samuel Strauss** individually and as copartners as **Strauss Company,** metal workers 370 Richmond street, have filed a voluntary petition in bankruptcy in Federal Court here. They schedule their liabilities at $19,096 and assets at $3,508.

Hampick M. Arabian, for forty years a manufacturer of jewelry enamel in Providence and known as one of the most expert jewelry craftsmen in the United States died August 15 at the Memorial Hospital, Pawtucket, R. I. He was born in Constantinople, Turkey, in 1869 but came to America while in his teens and took employment at Attleboro, Mass., in the manufacturing jewelry industry. After a few years he removed to Providence where he established the jewelry enamel business with which he was connected at the time of his death. He designed and made the famous 10-foot cross of gold and silver, studded with precious stones, now in the Armenian Cathedral in Constantinople also the handsome cross in the Armenian Euphrates Evangelical Church this city from which he was buried. He is survived by his widow, a son, Joseph E. Arabian who was associated with his father in the business and a daughter.

The name of the **Fray Jewelry Company,** of Cranston, has been changed to **Thomas McGrath, Inc.**

Joseph Rogovous, formerly foreman for the **J. P. Bonnett & Son Company,** is now associated with the **Quaker Plating Company,** 107 Friendship street.

The regular monthly meetings of the **Metal Finding Manufacturers' Association** will be resumed the first Wednesday in September after a three months' recess.—W. H. M.

Middle Western States

Detroit, Michigan

September 1, 1934.

Slowing up of production in the non-ferrous metal industry during the past month does not forecast anything ominous for the approaching Fall, according to those well-informed concerning manufacturing in this area.

Present conditions are seasonal and certain to change for the better just as they did a year ago. Everything points to a revival of all lines of industry within the next few weeks. According to **Alfred P. Sloan, Jr.,** president of the **General Motors Corporation,** American industry is poised for a titanic forward step that will surpass anything that has gone before.

There is no getting around the fact, however, that manufacturing has been tapering off for the last several weeks and that many plants where brass, copper, aluminum and plating are concerned, are close to their minimum records. Automobile production is on the decline.

Manufacturers of refrigeration units are experiencing no summer slump. This industry has been increasing from month to month. Most of the plants are in high production with no indication of anything but steady progress for months to come.

Not much can be said concerning plumbing and steam fitting supplies. Production in these lines has been low for an indefinite period. Nothing very encouraging seems to be in sight.

Most of the plating plants have had a good Spring, but production has tapered off within the last few weeks.

It is definitely announced that the **Packard Motor Car Company** will be in the field, at the beginning of the 1935 selling season with a complete new line of smaller, low-priced cars to supplement its diverse line of larger cars. Factory changes, it is stated, have been made which permit an annual production of 137,000 cars, as compared with a previous capacity of 50,000 cars annually. The plant set-up is now in two sections, one devoted to production of the proposed smaller car and the other to a continuation of the present lines, in 1935 dress. No information is at hand as to the mechanical features of the new Packard line.

The **Pontiac Manufacturing Company,** 424 Ferry street, Pontiac, Mich., has recently been incorporated by **Hugh Chalmers, Jr.** The capital stock is $30,000. This concern deals in motor car parts.

The **Ecorse Foundry Company** is a newly incorporated concern at Ecorse, Mich. It is engaged in general foundry business. The principal owner is John **M. Grinnian.**

The **Mohawk Smelting & Refining Company** is a new concern at 8224 Livernois avenue, Detroit. The principal owner is **Arthur Mayer.** The capital stock consists of 100 shares of no par value, it is stated.—F. J. H.

Toledo, Ohio

September 1, 1934.

Like most of the other industrial centers on the Great Lakes, manufacturing and business in general are still in the summer decline. However, there is much encouragement seen in the future.

It looks now as if industry were poised for an early getaway. This applies particularly to the motor car which is so vital to manufacturers in Toledo and other industrial communities. Most of these concerns were active until the midsummer decline set in a few weeks ago. Now they are preparing for heavy demands from motor-car accessories with the early revival of the industry.

Conditions in Cleveland are practically the same as in Toledo. Manufacturers concerned with non-ferrous metals are marking time and preparing for activities that seem assured at an early date.

—F. J. H.

Chicago, Illinois

September 1, 1934.

Althought most of the firms have been experiencing the summer seasonal lull, business throughout the non-ferrous trade in this locality is very favorable, a brisk upturn being looked for confidently in the Fall. All manufacturers interviewed report an increase over last month.

C. Zint, Vice President of the **Central Pattern and Foundry Company**, reports they have been operating day and night for the past seven months manufacturing aluminum castings for electrical manufacturers throughout the country. Business is more than 100% better than last year and more than twice the number of people are employed, all at full time. "Unquestionably," said Mr. Zint, "the Code has helped us tremendously, both by the increased prices and the stimulated activity." When asked to what he attributed their increase in business he replied, "just because we went out and got it."

The **Advance Independent Electrotype Company** have been experiencing slight retardation of business during the summer months but the outlook for a good Fall trade is very encouraging.

Their business is much better than last year.

According to **E. J. Kelly** of the **Chicago Brass Works** their business is double that of last year, and up until about three months ago showed a steady increase. Since that time it has been somewhat at a standstill. Their orders are largely from the brewery supply houses, being mostly for filters and cooling apparatus. They are operating under the Code and their lowest paid employee is receiving more than 20% over the minimum wage requirement called for by the Code. Requests for castings and candy mouldings are beginning to come in briskly and they look for a busy fall season with a particularly large number of orders from the candy and food packing industry.

A. Loren, secretary, advises that the **Leitelt Brothers**, dealing chiefly in part replacements, have had a good year and are doing considerably better than a year ago. About the same number of people are employed, but all are now working full time in lieu of part time last year.

The **Hegeler Zinc Company** of Danville, Illinois, have experienced a fair summer season and conditions in general are better. The largest portion of their business is in the weather strip, automobile, radio, and especially in the dry cell battery trade.

The **American Nickeloid Company** of Peru, Illinois, manufacturers of prefinished metals are looking for better conditions this Fall.

The **Continental Can Company** have recently manufactured a can made of zinc coated sheet iron, coated by electrolytic process, (cheaper than either copper or tin) for use by the oil people for lubricating oils, and have made a request of the Traffic Service Corporation of Washington that commodity rates on iron or steel sheet, coated with zinc, carload and less than carload, from all Eastern origin groups to Pacific Coast destinations, the same as now applicable on tin plate or terne plate, from and to the same points, be established. The application states that interested shippers will commence shipping zinc coated sheet steel from mills in the Chicago and Pittsburgh districts as soon as the proposed publication becomes effective.

Matthiesen & Hegeler Zinc Company, La Salle, Ill., filled orders this month for two boxes of sheet zinc for the **Eagle Laundry Tray Company**, San Bruno, California, three hundred pounds of zinc for the **Baker Hamilton & Pacific Company**, San Francisco, California, and ten boxes of sheet zinc to the **Federated Metals Corporation**, San Francisco, California. This firm is an extensive shipper to the Pacific Coast.

The **American Zinc Products Company** of Greene Castle, Indiana, have been shipping a number of orders for zinc to the Pacific Coast, having this month supplied among others an order for six boxes of sheet zinc for the **U. S. Navy Department** at San Diego, California, and four boxes of sheet zinc for the **Rex Metal Works**, Seattle, Wash.

The **Aluminum Goods Company** of Manitowoc, Wis., shipped two carloads of aluminum toys this month to the **J. C. Penney Company** of Pasadena, California.

An open meeting of all silver platers of Chicago, most of whom are members of the Chicago Electro Platers Institute, was held August 20, at the Atlantic Hotel, to discuss business conditions prevailing and future policies of benefit to the silver plating trade. Among those present who took part in the very active general discussion were: **Morris Swartz** of **Swartz & Company, H. A. Gilbertson** of **Gilbertson & Son, James McVittie** of **McVittee Plating and Brass Refinishing Company, Homer E. Smith** of the **Brookline Platers Company, Ernest Van Duzer** of the **Alen Plating Company, John Alt** of the **Alt Silver Plating Manufacturing Company, Carl Rieffel** of the **Rieffel and Husted Company, Oscar Smith** of the **Norbert Plating Company**, and **P. C. Oleson**, Executive Secretary of the Chicago Branch of the **Master Electro Platers Institute of the United States.** No decisions were reached at the meeting but it is expected that another meeting will be called after hearing as to the acceptance of the Code, to take final action on several plans still in embryo form.—R. G. K.

Pacific States

Los Angeles, Cal.

September 1, 1934.

The **Art Metal Crafts** of 5506 West 25th street, Cicero, Ill., are pushing in the California market, the birds, flowers, plants, etc., made of die cast aluminum and enameled in colors.

The **Gold Refiners**, of 720 South Grand Ave., Los Angeles, have been increasing their refining of gold and silver and manufacturing articles in same lines.

The **Eureka Vacuum Cleaner Company**, of Detroit, have opened a branch factory here, at 2515 West 7th St., and plan to open ten new retail branch establishments, also for repair work. The Metal Polishers International Union threaten a strike against the members of the Associated Electro Platers of Southern California, demanding wages of 75 to 95 cents an hour, instead of the 50 cents being paid now. The whole subject is being studied by the authorities.

James Dewey of Sierra Madre makes and models tray ornaments and novelties, with an oxyacetylene torch and a pair of pliers.

The **Lockheed Aircraft Corporation**, of Glendale, have built a new building and also leased another large building for the all metal wings and fuselage assembly.

The **Koch Manufacturing Company**, of Evansville, Ind., are pushing on the Coast, the distribution of their floral specialties and equipment made of metal.

The **McCord Radiator Manufacturing Company**, of Detroit, have bought the petrogas or britone motive power idea for trucks which was invented by the Shell Oil Company here. This system also refrigerates the truck at the same time.

The **Kold-Hold Manufacturing Company** of Lansing, Mich., are making and introducing nationally, a new truck refrigeration, using two large metal containers in the truck, having in them a solution that hardens like a rock, from a compressor in the garage at night and will hold the cold down to 10 below for 24 to 48 hours. It is being sold here by the **Kelvinator Company** at 6th & Mateo Streets.

The **Smith-Johnson Corporation** of the Bendix Building are manufacturing a new lubricating gun.

The **Advance Body Company** of 1000 Macy St., have been building trucks for years, but have just made their first stream lined tank truck for gasoline hauling.

The **Royal Metal Manufacturing Company** of Michigan City, Ind., have started a branch plant in this city, to manufacture chrome metal furniture, at 1208 South Hill St. **Grumwell Wilcox** is in charge.

The **Revere Copper & Brass, Inc.**, of New York City, have appointed **A. J. Howell**, Pacific Coast manager at San Francisco, succeeding **E. H. Binns**, who has been transferred to the home office.

The **Jesse K. Dodge Welding & Boat Works**, at 1328 West 7th St., Long Beach, are making stream lined, aerdynamic, all electric welded express cruisers and yachts, 33 feet in length, 18 knots speed.

The **Schroeder Refrigeration Service Company**, at 4520 South Figueroa St., are specializing in the installation of truck refrigeration units.

The **Fedders Manufacturing Company** of Buffalo, N. Y., have opened branch factories, to make refrigerating coils and equipment, at 923 East 3rd. St., Los Angeles; 209 South Pearl St., Dallas, Tex.; 603 West Washington, Chicago.

The **Venetian Blind & Manufacturing Company** here have opened a factory at 2700 South Maple Ave., and also to make hardware specialties. The head men are **W. E. Lindbloom, J. E. Cooper** and **M. C. Israel.**

The **Westport Manufacturing Company** of Glendale, are manufacturing a new dynamometer, a light weight motor generator for use in conjunction with aircraft radio receivers, cadmium plated and weighing less than seven pounds.

The **Inventive Engineering Company** of 1522 Glendale Blvd., are building metal kitchen and factory ventilators and fans and windmills.

The **U. S. Porcelain Enamel Company** of 4635 East 52nd Drive, are making all kinds of metal goods, enamel fused on them.

C. P. Stewart of this city has started making sun bath cabinets.

The **Electric Screen Corporation** of 7 Pico, Calif., are making electric metal screens, which kills flies as soon as they alight on it.—H. S.

Metal Market Review

September 4, 1934.

Activity in metals during the month of August was on the whole, unexciting. Prices changed little, if at all and buying was in most cases, routine with the minimum quantities necessary, following the seasonal dullness.

Copper was unchanged throughout the month for Blue Eagle, with small activity. It was stated that foreign turnover was greater, being in the "outside" metal not covered by Blue Eagle regulations and prices. One retarding influence is the strict control of imports of copper by Germany.

Statistics released by the American Bureau of Metal Statistics point out that copper operations outside of the Blue Eagle covering the first half of the year, revealed an upward trend of about 15 per cent.

Zinc slipped from 4.30 for prime Western, F. O. B., E. St. Louis, to 4.25 during the latter part of the month but sales failed to improve. World zinc production was maintained at an even rate, as was also American production.

Tin opened the month at 51.70 for September, went as high as 52.90 and closed at 51.40, reflecting clearly the absence of the great interest. Statistics recently released are interesting. World tin consumed showed an increase of 22 per cent for the year ending June 1934 as compared with the previous twelve months. The United States consumed about 56,000 long tons. A recent announcement states that the production of tin has now been set by an international cartel.

Lead was another metal to suffer a slight set-back, dropping from 3.65 to 3.60 F. O. B. St. Louis, at the close of the month. Buying was resumed in good volume even though the July statistics revealed another increase in the stocks on refined lead.

Aluminum and **Nickel** were as usual unchanged in price.

The aluminum situation is somewhat unsettled by several factors which include a Code of Fair Competition which is operating only on a trial basis, and may be changed very shortly; the investigation by the Department of Justice of the leading producer for alleged monopolistic practice, and the existence of a strike of considerable proportions in the plants of the Aluminum Company.

Nickel continues to do very well. Recent months have shown something of a decline in production due to reduced sales volume, but 1934 will be good.

Antimony moved narrowly, from 8.125 as high as 8.75 and closed at 8.625.

Silver has been greatly affected by the recent Presidential order, monetizing that metal. The fixed Government price of 50.01 per ounce for all the existing stocks of silver taken over by the Treasury, has for practical purposes, set the market definitely at 49.75 or thereabouts.

Platinum was unchanged at $34 and **Gold** at $35 per ounce.

Scrap Metals reflected the condition of the markets and changed little, with the volume of business also not impressive. As will be noted from the Ingot Metal Statistics on this page prices were practically the same as last month. Prices for scrap paid by the brass mills were reduced ¼ cents per pound on copper base mixtures on August 17.

Ingot Metal Statistics

Non-Ferrous Ingot Metal Institute reports the average prices per pound received by its membership on Commercial Grades of six principal mixtures of Ingot Brass during the twenty-eight day period ending August 10.

Commercial 80-10-10 (1½% Impurities)	10.377c.
Commercial 78% Metal	8.018c.
Commercial 81% Metal	8.250c.
Commercial 83% Metal	8.628c.
Commercial 85-5-5-5	8.761c.
Commercial No. 1 Yellow Brass Ingot	7.003c.

From reports made by thirty-nine companies engaged in that industry, the combined shipments and deliveries of Ingot Brass and Bronze made during July, 1934, amounted to 4,317 net tons.

The Wrought Metal Market

September 4, 1934.

The code of fair competition for the wholesale copper, brass, bronze and related alloy trades was approved and went into effect August 23. Copies of the code may be obtained from Cornelius Lauritzen, secretary, 304 Hudson Street, New York City. Regional code authorities will be set up to govern districts in accordance with their local needs. Provisions are included for declaring emergencies, and in that event fixing a basis for determining minimum prices for specified products for a stated period.

General business dullness had its effect of course, upon wrought and fabricated metal products. The Connecticut Valley operations were reduced and with the automobile industry sharply curtailed at this time, sales have dropped off. The outlook for the fall is said to be fair.

Daily Metal Prices for August, 1934

Record of Daily, Highest, Lowest and Average Prices and the Customs Duties

	1	2	3	6	7	8	9	10	13	14	15	16	17
Copper c/lb. Duty 4 c/lb.													
Lake‡ (del. Conn. Producers' Prices)	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125
Electrolytic‡ (del. Conn. Producers' Prices)	9.00	9.00	9.00	9.00	9.00	9.00	9.06	9.00	9.00	9.00	9.00	9.00	9.00
Casting (f.o.b. ref.)	8.125	8.125	8.125	8.125	8.125	8.125	8.125	8.125	8.125	8.125	8.125	8.125	8.125
Zinc (f.o.b. East St. Louis) c/lb. Duty 1¼ c/lb.													
Prime Western (for Brass Special add 0.05)	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30
Tin (f.o.b. N. Y.) c/lb. Duty Free, Straits	51.70	51.65	51.75	51.70	51.70	51.75	52.25	52.00	52.90	52.75	52.30	52.20	52.35
Lead (f.o.b St. L.) c/lb. Duty 2¼ c/lb.	3.65	3.65	3.65	3.65	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60
Aluminum c/lb. Duty 4 c/lb.	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30
Nickel c/lb. Duty 3 c/lb.													
Electrolytic 99.9%	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
Antimony (Ch.99%) c/lb. Duty 2 c/lb.	8.125	8.125	8.25	8.25	8.25	8.25	8.375	8.50	8.75	8.75	8.75	8.75	8.625
Silver c/oz. Troy, Duty Free	46.375	46.625	46.75	47.00	47.375	48.00	49.25	49.75	49.75	49.75	49.75	49.75	49.75
Platinum $/oz. Troy, Duty Free	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00
Gold—Official Price[1] $/oz. Troy	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00

	20	21	22	23	24	27	28	29	30	31	High	Low	Aver.
Copper c/lb. Duty 4 c/lb.													
Lake‡ (del. Conn. Producers' Prices)	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125
Electrolytic‡ (del. Conn. Producers' Prices)	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
Casting (f.o.b. ref.)	8.125	8.125	8.125	8.125	8.125	7.875	7.875	7.875	7.875	7.875	8.125	7.875	8.027
Zinc (f.o.b. East St. Louis) c/lb. Duty 1¼ c/lb.													
Prime Western (for Brass Special add 0.05)	4.30	4.275	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.225	4.30	4.20	4.280
Tin (f.o.b. N. Y.) c/lb. Duty Free, Straits	52.20	52.05	52.00	51.90	51.70	51.95	51.65	51.40	51.40	51.55	52.90	51.40	51.948
Lead (f.o.b St. L.) c/lb. Duty 2¼ c/lb.	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.65	3.55	3.603
Aluminum c/lb. Duty 4 c/lb.	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30
Nickel c/lb. Duty 3 c/lb.													
Electrolytic 99.9%	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
Antimony (Ch.99%) c/lb. Duty 2 c/lb.	8.625	8.625	8.625	8.625	8.625	8.625	8.625	8.625	8.625	8.625	8.75	8.125	8.522
Silver c/oz. Troy, Duty Free	49.75	49.75	49.75	49.75	49.625	49.625	49.625	49.625	49.625	49.625	49.75	46.375	48.986
Platinum $/oz. Troy, Duty Free	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00
Gold—Official Price[1] $/oz. Troy	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00

‡ Blue Eagle Copper. [1] United States Treasury price.

Metal Prices, September 4, 1934

(Import duties and taxes under U. S. Tariff Act of 1930, and Revenue Act of 1932)

NEW METALS

Copper: Lake, 9.125, Electrolytic, 9.00, Casting, 7.875. **Zinc:** Prime Western, 4.20. Brass Special, 4.30. **Tin:** Straits, 51.95. Pig, 99%, 51.20. **Lead:** 3.60. **Aluminum,** 23.30. **Antimony,** 8.625. **Nickel:** Shot, 36. Elec., 35.

Quicksilver: Fasks, 75 lbs., $75.50. **Bismuth,** $1.20 **Cadmium,** 55. **Silver,** Troy oz., official price, N. Y., Sept. 4, 49⅝. **Gold:** oz., Troy, Official U. S. Treasury price Sept. 4, $35.00. **Scrap Gold,** 6½c. per pennyweight per karat, dealers' quotation, Aug. 3. **Platinum,** oz. Troy, $34.00.

Duties: Copper, 4c. lb.; zinc, 1¼c. lb.; tin, free, lead, 2½c. lb.; aluminum, 4c. lb.; antimony, 2c. lb.; nickel, 3c. lb.; quicksilver, 25c. lb.; bismuth, 7½%; cadmium, 15c. lb.; cobalt, free; silver, free; gold, free; platinum, free.

INGOT METALS AND ALLOYS

	Cents lb.	U. S. Import Duty	Tax*
Brass Ingots, Yellow	7 to 8	None	4c. lb.[1]
Brass Ingots, Red	8¼ to 11	do	do
Bronze Ingots	9¼ to 12½	do	do
Aluminum Casting Alloys	15½ to 22	4c. lb.	None
Manganese Bronze Castings	20 to 34	45% a. v.	3c. lb.[2]
Manganese Bronze Forgings	26 to 38	do	do
Manganese Bronze Ingots	8¾ to 13	do	4c. lb.[1]
Manganese Copper, 30%	11½ to 16	25% a. v.	3c. lb.[2]
Monel Metal Shot or Block	28	do	None
Phosphor Bronze Ingots	10 to 12	None	4c. lb.[1]
Phosphor Copper, guaranteed 15%	13¼ to 15	3c. lb.[2]	do
Phosphor Copper, guaranteed 10%	11½ to 14	do	do
Phosphor Tin, no guarantee	61 to 75	None	None
Silicon Copper, 10%	18 to 30	45% a. v.	4c. lb.[1]
Iridium Platinum, 5%	$36-37.50	None	None
Iridium Platinum, 10%	$37-38.50	None	None

*Duty is under U. S. Tariff Act of 1930; tax under Section 60 (7) of Revenue Act of 1932.
[1]On copper content. [2]On total weight. "a. v." means ad valorem.

OLD METALS

Dealers' buying prices, wholesale quantities:	Cents lb.	Duty	U. S. Import Tax
Heavy copper and wire, mixed	6⅜ to 6⅝	Free	4c. per pound on copper content.
Light copper	5½ to 5¾	Free	
Heavy yellow brass	3⅜ to 3⅝	Free	
Light brass	3 to 3⅛	Free	
No. 1 composition	4⅞ to 5⅛	Free	
Composition turnings	4⅝ to 4⅞	Free	
Heavy soft lead	3 to 3¼	2½c.lb.	None.
Old zinc	2¼ to 2⅜	1½c.lb.	
New zinc clips	2¾ to 3	1½c.lb.	
Aluminum clips (new, soft)	12¼ to 13¼	4c.lb.	
Scrap aluminum, cast	9¼ to 10	4c.lb.	
Aluminum borings—turnings	5 to 5½	4c.lb.	
No. 1 pewter	30 to 32	Free	
Electrotype or stereotype	2⅞ to 3	2½c. lb.*	
Nickel anodes	30 to 33	10%	
Nickel clips, new	31 to 33	10%	
Monel scrap	11 to 18½	10% a.v.	

*On lead content.

Wrought Metals and Alloys

The following are net BASE PRICES per pound, to which must be added extras for size, shape, quantity, packing, etc., or discounts, as shown in manufacturers' price lists, effective since June 12, 1934. Basic quantities on most rolled or drawn brass and bronze items below are from 2,000 to 5,000 pounds; on nickel silver, from 1,000 to 2,000 pounds.

COPPER MATERIAL

	Net base per lb.	Duty*
Sheet, hot rolled	16c.	2½c. lb.
Bare wire, soft, less than carloads	12.75c.	25% a. v.
Seamless tubing	17.25c.	7c. lb.

*Each of the above subject to import tax of 4c. lb. in addition to duty, under Revenue Act of 1932.

BRASS AND BRONZE MATERIAL

	Yellow Brass	Red Brass 80%	Comm'l. Bronze	Duty	
Sheet	14½c.	15⅜c.	16	4c. lb.	U. S. Import Tax
Wire	15 c.	15⅞c.	16½	25%	
Rod	13 c.	15⅞c.	16⅜	4c. lb.	4c. lb. on copper content
Angles, channels	22½c.	23⅝c.	24	12c. lb.	
Seamless tubing	17 c.	17¾c.	18⅝	8c. lb.	
Open seam tubing	22½c.	23⅝c.	24	20% a. v.	No tax.

NICKEL SILVER

Net base prices per lb. (Duty 30% ad valorem.)

Sheet Metal		Wire and Rod	
10% Quality	23.75c.	10% Quality	26.625c.
15% Quality	25.875c.	15% Quality	31.00c.
18% Quality	27.125c.	18% Quality	34.25c.

TOBIN BRONZE AND MUNTZ METAL

(Duty 4c. lb.; import tax 4c. lb. on copper content.)

Net base prices per pound.	
Tobin Bronze Rod	16½c.
Muntz or Yellow Rectangular and other sheathing	17⅝c.
Muntz or Yellow Metal Rod	14 c.

ALUMINUM SHEET AND COIL

(Duty 7c. per lb.)

Aluminum sheet, 18 ga., base, ton lots, per lb.	32.80
Aluminum coils, 24 ga., base price, tons lots, per lb.	30.50

ROLLED NICKEL SHEET AND ROD

Duty 25% ad valorem, plus 10% if cold worked.)

Net Base Prices

Cold Drawn Rods	50c.	Cold Rolled Sheet	60c.
Hot Rolled Rods	45c.	Full Finished Sheet	52c.

MONEL METAL SHEET AND ROD

Duty 25% ad valorem, plus 10% if cold worked.)

Hot Rolled Rods (base)	35	Full Finished Sheets (base)	42
Cold Drawn Rods (base)	40	Cold Rolled Sheets (base)	50

SILVER SHEET

Rolled sterling silver (September 4) 51½c. per Troy oz. upward according to quantity. (Duty, 65% ad valorem.)

ZINC AND LEAD SHEET

	Cents per lb. Net Base	Duty
Zinc sheet, carload lots, standard sizes and gauges, at mill, less 7 per cent discount	9.50	2c. lb.
Zinc sheet, 1200 lb. lots (jobbers' price)	10.25	2c. lb.
Zinc sheet, 100 lb. lots (jobbers' price)	14.25	2c. lb.
Full Lead Sheet (base price)	7.25	2½c. lb.
Cut Lead Sheet (base price)	7.50	2½c. lb.

BLOCK TIN, PEWTER AND BRITANNIA SHEET

(Duty Free)

This list applies to either block tin or No. 1 Brittannia Metal Sheet, No. 23 B. & S. Gauge, 18 inches wide or less; prices are all f. o. b. mill:

500 lbs. or over	15c. above N. Y. pig tin price
100 to 500 lbs.	17c. above N. Y. pig tin price
Up to 100 lbs.	25c. above N. Y. pig tin price
Up to 100 lbs.	25c. above N. Y. pig tin price

Supply Prices on page 332.

Supply Prices, September 4, 1934

ANODES

Prices, except silver, are per lb. f.o.b., shipping point, based on purchases of 500 lbs. or more, and subject to changes due to fluctuating metal markets.

Copper: Cast ..... 16½c. per lb.
Electrolytic, full size, 13½c.; cut to size 14c. per lb.
Rolled oval, straight, 13¾c.; curved, 15¼c. per lb.
Brass: Cast ..... 15c. per lb.
Zinc: Cast ..... 9c. per lb.

Nickel: 90-92% ..... 44c. per lb.
95-97% ..... 45c. per lb.
99%+cast, 47c.; rolled, depolarized, 48c.
Silver: Rolled silver anodes .999 fine were quoted Sept. 4, from 52¾c. per Troy ounce upward, depending upon quantity.

WHITE SPANISH FELT POLISHING WHEELS

Diameter	Thickness	Under 50 lbs.	50 to 100 lbs.	Over 100 lbs.
10-12-14 & 16	1" to 2"	$2.95/lb.	$2.65/lb.	$2.45/lb.
10-12-14 & 16	2 to 3½	2.85	2.55	2.35
6-8 & over 16	1 to 2	3.05	2.75	2.55
6-8 & over 16	2 to 3½	3.00	2.70	2.45
6 to 24	Under ½	4.25	3.95	3.75
6 to 24	½ to 1	3.95	3.65	3.45
6 to 24	Over 3½	3.35	3.05	2.85

Any Quantity

4 to 6	Under ⅛, $5.00	⅛-1, $4.85	1 to 3, $4.75
1⅛ to 4	" 5.55	" 5.40	" 5.35
1 to ½	" 5.85	" 5.70	" 5.60

Extras: 25c per lb. on wheels, 1 to 6 in. diam., over 3 in. thick. On grey Mexican wheels deduct 10c. per lb. from above prices.

COTTON BUFFS

Full disc open buffs, per 100 sections when purchased in lots of 100 or less were quoted July 2:

16" 20 ply 84/92 Unbleached	82.11
14" 20 ply 84/92 Unbleached	62.92
12" 20 ply 84/92 Unbleached	47.27
16" 20 ply 80/92 Unbleached	67.64
14" 20 ply 80/92 Unbleached	51.91
12" 20 ply 80/92 Unbleached	39.09
16" 20 ply 64/68 Unbleached	60.41
14" 20 ply 64/68 Unbleached	46.41
12" 20 ply 64/68 Unbleached	35.00

⅜" Sewed Pieced Buffs, per lb., bleached or unbleached 40c. to 1.09

CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone C. P.	lb.	.11½-.12½
Acid—Boric (Boracic) granular, 99½+% ton lots	lb.	.04½-.05
Chromic, 75 to 400 lb. drums		.15-.15¼
Hydrochloric (Muriatic) Tech., 20 deg., carboys	lb.	.03
Hydrochloric, C. P., 20 deg., carboys	lb.	.06½
Hydrofluoric, 30%, bbls.	lb.	.07-.08
Nitric, 36 deg., carboys	lb.	.05-.06¼
Nitric, 42 deg., carboys	lb.	.07-.08
Sulphuric, 66 deg., carboys	lb.	.02
Alcohol—Butyl, drums	lb.	.09½-.11
Denatured, drums	gal.	.475-.476
Alum—Lump, barrels	lb.	.03¼-.04
Powdered, barrels	lb.	.03½-.05
Ammonia, aqua, com'l., 26 deg., drums, carboys	lb.	.02½-.05
Ammonium—Sulphate, tech., bbls.	lb.	.03½-.05
Sulphocyanide, technical crystals, kegs	lb.	.50-.58
Arsenic, white kegs	lb.	.04½-.05
Asphaltum, powder, kegs	lb.	.23-.41
Benzol, pure, drums	gal.	.41
Borax, granular, 99½+%, ton lots	lb.	.02¼-.02¾
Cadmium oxide, 50 to 1,000 lbs.	lb.	.55
Calcium Carbonate (Precipitated Chalk), U. S. P.	lb.	.05¾-.07½
Carbon Bisulphide, drums	lb.	.05½-.06
Chrome, Green, commercial, bbls.	lb.	21½-23½
Chromic Sulphate, drums	lb.	.33-.55
Copper—Acetate (Verdigris)	lb.	.21
Carbonate, 53/55% cu., bbls.	lb.	.15-.16½
Cyanide (100 lb. kgs.)	lb.	.38-.40
Sulphate, tech., crystals, bbls.	lb.	4.55-5c.
Cream of Tartar Crystals (Potassium Bitartrate)	lb.	.20¼-.20½
Crocus Martis (Iron Oxide) red, tech., kegs.,	lb.	.07
Dextrin, yellow, kegs	lb.	.05-.08
Emery Flour	lb.	.06
Flint, powdered	ton	30.00
Fluorspar, bags	lb.	.03½
*Gold Chloride	oz.	$18¼-23
Gum—Sandarac, prime, bags	lb.	.50
Shellac, various grades and quantities	lb.	.21-.31
Iron Sulphate (Copperas), bbls.	lb.	.01½
Lead—Acetate (Sugar of Lead), bbls.	lb.	.10-.13½
Oxide (Litharge), bbls	lb.	.12½
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.58
Methanol, (Wood Alcohol) 100% synth., drums	gal.	.42½
Nickel—Carbonate, dry, bbls.	lb.	.35-.41
Chloride, bbls.	lb.	.18-.22
Salts, single, 300 and 425 lb. bbls.	lb.	.12-.13
Salts, double, 425 lb. bbls.	lb.	.12-.13
Paraffin	lb.	.05-.06
Phosphorus—Duty free, according to quantity	lb.	.35-.40
Potash Caustic Electrolytic 88-92% broken, drums	lb.	.08-.093
Potassium—Bichromate, casks (crystals)	lb.	.08⅜
Carbonate, 96-98%	lb.	.08¾
Cyanide, 165 lbs. cases, 94-96%	lb.	.57½
Gold Cyanide	oz.	$15.45*
Pumice, ground, bbls.	lb.	.02½
Quartz, powdered	ton	$30.00
Rosin, bbls.	lb.	.04½
Rouge—Nickel, 100 lb. lots	lb.	.08
Silver and Gold	lb.	.65
Sal Ammoniac (Ammonium Chloride) in bbls.	lb.	.05-.07½
*Silver—Chloride, dry, 100 oz. lots	oz.	.41½
Cyanide, 100 oz. lots	oz.	.49¼-.50⅜
Nitrate, 100 ounce lots	oz.	.35½
Soda Ash, 58%, bbls.	lb.	.0252
Sodium—Cyanide, 96 to 98%, 100 lbs.	lb.	.16½-.22
Beryllium fluoride (2NaF. BeF_2)	lb.	4.30-7.00
Gold Cyanide	oz.	$17.10*
Hyposulphite, kegs, bbls.	lb.	.03½-.06½
Metasilicate, granular, bbls.	lb.	3.55-3.70
Nitrate, tech., bbls.	lb.	.02¼
Phosphate, tribasic, tech., bbls.	lb.	.03¾
Silicate (Water Glass), bbls.	lb.	.01½
Stannate, drums	lb.	.34-.37
Sulphocyanide, drums	lb.	.30-.45
Sulphur (Brimstone), bbls.	lb.	.02
Tin Chloride, 100 lb. kegs	lb.	.39
Tripoli, powdered	lb.	.03
Trisodium Phosphate—see Sodium Phosphate.		
Wax—Bees, white, ref. bleached	lb.	.60
Yellow, No. 1	lb.	.45
Whiting, Bolted	lb.	.02½-.06
Zinc—Carbonate, bbls.	lb.	.11-.12
Cyanide (100 lb. kegs)	lb.	.07½-.10
Chloride, drums, bbls.	lb.	.38
Sulphate, bbls.	lb.	.033-.037

*Gold and silver products subject to fluctuations in metal prices.